

68

\$2.95_{USA}

Australia
Singapore

A \$ 4.75
S \$ 9.45
Malaysia

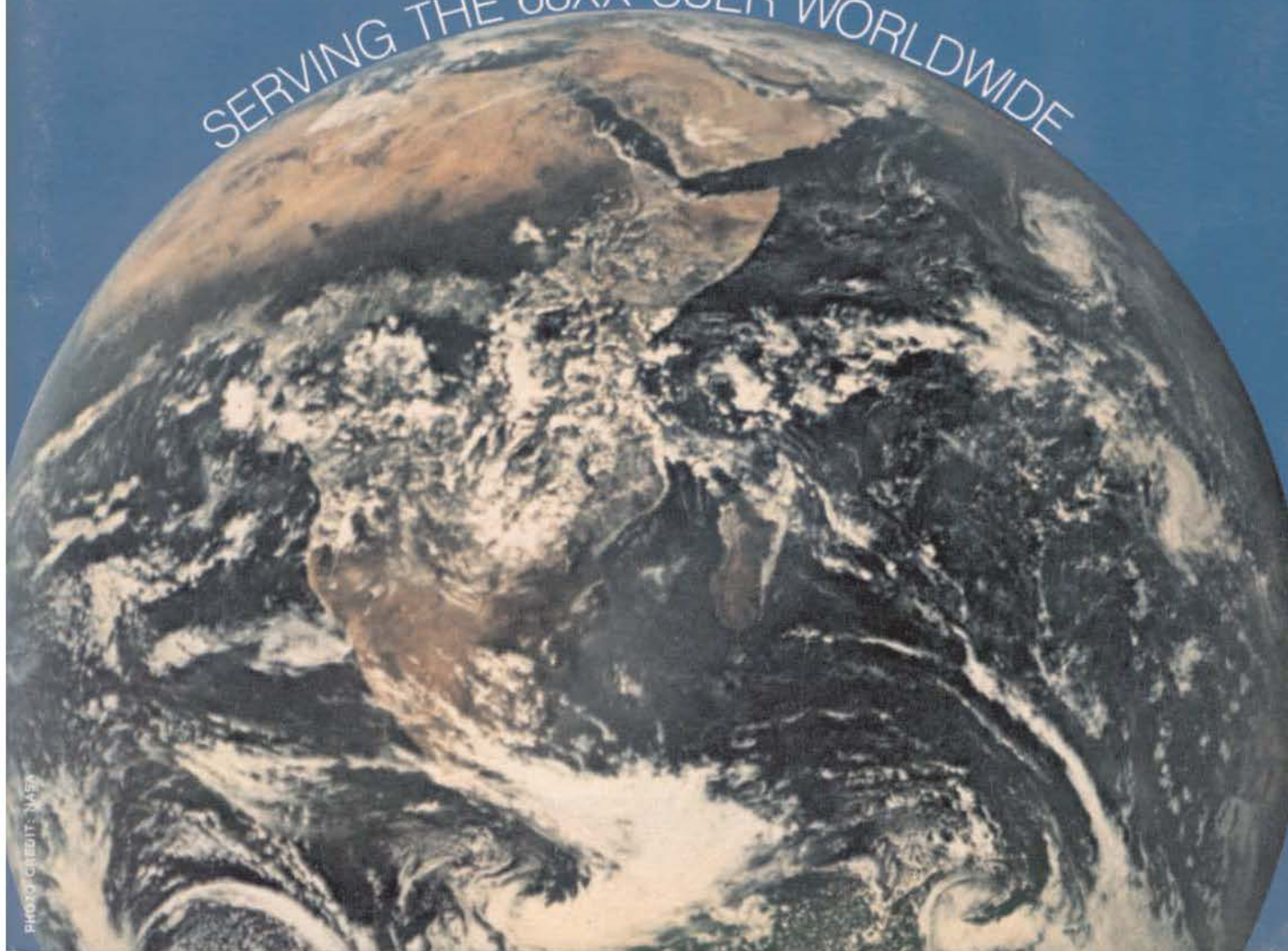
New Zealand
Hong Kong
M \$ 9.45

NZ \$ 4.75
H \$23.50

MICRO JOURNAL

VOLUME IV ISSUE III • Devoted to the 68XX User • March 1982
"Small Computers Doing Big Things"

SERVING THE 68XX USER WORLDWIDE





YOUR CHOICE-smart either way

- Over 140 software driven functions
- 82 x 24 or 82 x 20 screen format — software selectable
- High resolution 7 x 12 matrix characters — P-31 green phosphor
- Upper/lower case character set — plus graphics character set
- 56-key alphanumeric keyboard — plus 12-key cursor, numeric pad
- Internal editing functions — insert, delete, scroll, roll, slide, etc.
- Parallel printer I/O port
- 50 to 38,400 baud operation — programmable
- Cursor type, cursor position, print control characters, protected fields, shift inversion, dual intensity and many other features

8212 — twelve-inch diagonal screen or 8209 — nine-inch diagonal screen



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216

(512) 344-0241

Pascal for 6809

Pascal for the 6809 is a true native code compiler. Unlike the usual P-code Pascals which run in an interpretive manner, ours produces efficient assembly language mnemonics which can be assembled and run directly. This compiler is available for both 6809 FLEX™ and UniFLEX™. Many features not found in other Pascal systems were implemented while avoiding those features completely non-standard. Features of the Pascal system include:

- Supports most of Jensen and Wirth specification
- Produces fast and efficient 6809, native code
- FLEX run-time package may be trimmed
- Double precision real numbers (16.8 digits)
- Implements scalar, subrange and structured data types
- Standard I/O using file buffer pointers
- Dynamic storage allocation
- Ability to call other Pascal programs
- FLEX version may call assembly language programs
- Buffered or single character terminal input
- Standard math functions: SIN, COS, ARCTAN, EXP, LN, SQR, SQRT
- Random number generator function
- Many usable, sample programs included
- UniFLEX version supports:
 - Random file positioning
 - Ability to call various UniFLEX system routines
 - Ability to execute UniFLEX utility commands

Pascal on diskette for 5" and 8" 6809 FLEX is available for \$200.00. The 5" version requires two disk drives. The UniFLEX version is \$300.00 and includes one year of maintenance. All orders should include 3 percent for postage and handling (10 percent on foreign orders).

™FLEX and UniFLEX are trademarks of Technical Systems Consultants, Inc.



**technical systems
consultants, inc.**

Box 2570, West Lafayette, IN 47906
(317) 463-2502

'68'

Portions of text prepared using the following.

SWTPC 6800-6809-DMAF2-CDS1-CT82-Sprint 3
Southwest Technical Products
219 W. Rhapsody
San Antonio, Texas 78216

EDITOR - WORD PROCESSOR
Technical Systems Consultants, Inc.
Box 2573, W. Lafayette, IN 47906
FLEX is TM of TSC

GIMIX Super Mainframe-Assorted memory boards
GIMIX Inc.
1337 West 37th Place
Chicago, IL 60609

Publisher: Don Williams Sr.

Executive Editor: Larry Williams

Subscriptions and Office manager
Mary Robertson

General Girl 'Friday'
Joyce Williams

Contributing Editors:

Ron Anderson
Norm Commo
Dr. Theo Elbert
Bob Nay
Dale Puckett

VOL. IV...ISSUE III MARCH 1982

FLEX USER NOTES.....	16	Anderson
68XX CONVENTION.....	17	
COLOR USER NOTES.....	18	Nay
SUPER "COLOR" TERMINAL...	21	Nelson
COLOR INFO.....	22	Kahn
GIMIX CATALOG COMMENT....	23	
A NEW C COMPILER.....	24	WORD'S WORTH
"C" USER NOTES.....	25	Commo
BIT-MAPPED GRAPHICS.....	28	Green
SWTPC C.....	30	
680X USER NOTES.....	30	AGC-NJ NEWSLETTER
OS-9 HEX ECHO ROUTINE....	31	Strunk
BIT BUCKET.....	35	All of us
COLOR COMPUTER MUSIC.....	35	Dilly
C MEMORY REVIEW.....	38	Cook
AAA EDITOR.....	39	Wolach
CALCOMP DRIVES WITH /09..	41	Kitazume
CLASSIFIED ADVERTISING...	42	
HELP.....	42	

MICRO JOURNAL

Send All Correspondence To:

68 MICRO JOURNAL
5900 Cassandra Smith
Computer Publishing Center
PO Box 849
Hixson, TN 37343

615 842-4600

Copyrighted 1981 by CPI

'68' Micro Journal is published 12 times a year by '68' Micro Journal, 6131 Airways Blvd., Chattanooga, TN 37421. Second Class postage paid at Chattanooga, TN. Postmaster: Send Form 3579 to '68' Micro Journal, PO Box 849, Hixson, TN 37343.

1-Year \$24.50, 2-Year \$42.50, 3-Year \$64.50

—ITEMS SUBMITTED FOR PUBLICATION—

(Letters to the Editor for Publication) All 'letters to the Editor' should be substantiated by facts. Opinions should be indicated as such. All letters must be signed. We are interested in receiving letters that will benefit or alert our readers. Praise as well as gripes is always good subject matter. Your name may be withheld upon request. If you have had a good experience with a 6800 vendor please put it in a letter. If the experience was bad put that in a letter also. Remember, if you tell us who they are then it is only fair that your name 'not' be withheld. This means that all letters published, of a critical nature, cannot have a name withheld. We will attempt to publish 'verbatim' letters that are composed using 'good taste.' We reserve the right to define (for '68' Micro) what constitutes 'good taste.'

(Articles and items submitted for publication) Please, always include your full name, address, and telephone number. Date and number all sheets. TYPE them if you can, poorly handwritten copy is sometimes the difference between go, no-go. All items should be on 8X11 inch, white paper. Most all art work will be reproduced photographically, this includes all listings, diagrams and other non-text material. All typewritten copy should be done with a NEW RIBBON. All hand drawn art should be black on white paper. Please no hand written code items over 50 bytes. Neatly typed copy will be directly reproduced. Column width should be 3¼ inches.

(Advertising) Any Classified: Maximum 20 words. All single letters and/or numbers will be considered one (1) word. No Commercial or Business Type Classified advertising. Classified ads will be published in our standard format. Classified ads \$7.50 one time run, paid in advance.

Commercial and/or Business advertisers please write or phone for current rate sheet and publication lag time.

GIMIX 2MHZ 6809 SYSTEMS



GIMIX offers you a variety of system packages including systems that feature BOTH MICROWARE's OS-9 Level 1™ operating system and TECHNICAL SYSTEMS CONSULTANTS' FLEX™. Switch between these two predominant 6809 Disk Operating Systems, under software control, without the need to change PROMS, switches, or system configuration. System packages are also available for MICROWARE's OS-9 Level 2 and TECHNICAL SYSTEMS CONSULTANTS' UniFLEX™. You can select one of our featured systems or select from our wide variety of system components to build a custom system to suit your needs.

All systems include any required CPU Board options and are completely configured to your specifications. They do not include disk drives or terminals. See pages 4 and 5 for information on 5 1/4" drives for installation in the CLASSY CHASSIS and/or 8" disk drives and cabinets. Any combination of 5 1/4" and 8" floppy disk drives, up to four drives total, can be used with systems that include controller (except UniFLEX™ systems which require 8" drives).

For information and pricing on additional options see the appropriate pages of this brochure or contact the factory.

56KB 2MHZ 6809 SYSTEMS WITH GMXBUG/FLEX/OS-9 SOFTWARE SELECTABLE

INCLUDES: CLASSY CHASSIS, 6809 PLUS CPU Board, 56K Byte STATIC RAM, #43 Two Port Serial I/O board w/cables, and...
 with #58 single density disk controller (System #59) \$2988.59
 with #68 DMA double density disk controller (System #49) \$3248.49
 To substitute Non-Volatile CMOS RAM with battery back-up, add \$ 150.00

128KB 2MHz 6809 DMA Systems for use with TSC's UNIFLEX or MICROWARE's OS-9 Level 2

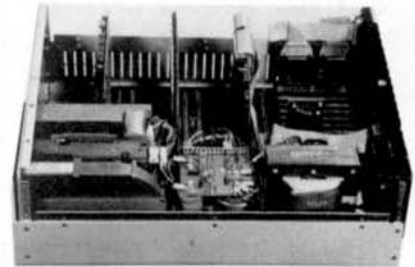
INCLUDES: CLASSY CHASSIS, 6809 PLUS CPU Board, #68 DMA Disk Controller, Two 64K Byte STATIC RAM Boards, #43 two Port Serial I/O board w/cables, (software not included, UniFLEX™ requires 8" disk drives) \$3798.39
 To substitute 128KB of Non-Volatile CMOS RAM w/Battery Back-Up add \$ 300.00

56 KB SYSTEM #29 This system can be used as the basis for a custom system to suit your special needs. It includes: CLASSY CHASSIS, 6809 PLUS CPU, 56KB STATIC RAM Board, and #43 TWO PORT SERIAL I/O board w/cables. You can add to this your choice of Disk Controllers, Memory, I/O, Software, etc. \$2498.29
 50 Hz version of above add \$ 30.00

The GIMIX CLASSY CHASSIS™ 6800 / 6809 SS-50 BUS MAINFRAME

The CLASSY CHASSIS includes:

A HEAVYWEIGHT, ALUMINUM CABINET (18" wide x 21" deep x 7" high) painted in a putty colored, durable baked enamel finish. The cabinet holds our 6800/6809 mother board, CV Ferro-resonant power supply, and has provisions for mounting one or two 5 1/4" Floppy or Winchester disk drives. The back panel is punched for 15 "D" type data connectors (25 pin) and has provisions for two removable connector plates that are available in a variety of connector configurations. Cabinets are normally supplied with two blank plates unless other types are required or specified. The cabinet includes a fan and ventilation slots which direct cooling air over the boards and power supply. The front panel has a 3 position, key locking, power switch that permits the reset switch to be locked out, preventing accidental system reset, and a three position RESET/ABORT switch. Optional filler plates are available for systems that do not use the 5 1/4" drive openings.



The 6800 / 6809 SS-50 / C MOTHERBOARD includes:

This highly versatile motherboard is easily reconfigured for a variety of 6800 and 6809, SS-50 and SS-50C bus configurations.

GOLD PLATED connectors are used throughout to insure long lasting electrical contact and protection against corrosion.

It has fifteen 50 pin slots, 8 DIP-switch addressable 30 pin I/O slots, and a special 10 pin slot for the baud rate generator board. The fully buffered I/O block can be configured for 4, 8, or 16 decoded addresses per slot, and is DIP-switch addressable to any 32, 64, or 128 byte boundary. Extended address decoding (SS-50C) allows the I/O block to be addressed anywhere in the 1M byte address space.

The baud rate generator board provides 11 standard (16X) baud rates, from 75 to 38.4K, in 2 groups. Programming jumpers allow easy selection of up to five baud rates. The five baud rate lines on the 50 pin bus are easily disconnected from the 30 pin bus for use with SS-50C extended addressing or as user defined lines. A slow I/O circuit, for the 6809 CPU, can be used to generate an MRDY signal whenever an I/O slot is accessed (This allows, for example, using PIO Disk Controllers with a 2MHz, 6809 CPU).

All data, address, and control lines are fully terminated and separated by noise reducing ground lines on the bottom of the board.

The .090" thick, double sided P.C. board has a full ground plane Faraday Shield on the top side to further reduce noise.

The CV Ferro-resonant Power Supply features a custom designed for GIMIX to GIMIX specs Constant Voltage, Ferro-resonant, faraday shielded, transformer that provides brown-out and overvoltage protection and permits the system to operate properly, even under adverse AC power input conditions. It also includes an AC line filter and AC resonant capacitor, 3 DC filter capacitors, and GIMIX unique filter assembly board that has a clamping terminal block for easy wiring connectors. The power supply provides +8 Volts at 30 Amps, +16 Volts at 5 Amps, and -16 Volts at 5 Amps; enough to power a fully loaded system plus the two 5 1/4" Disk drives, including Winchester types, that can be installed in the cabinet. All supply outputs are filtered and individually fused. The standard version operates over an AC input range of 90 to 140 Volts, 60 Hz. Export versions are available for inputs of 95 to 130 or 190 to 260 volts, 50 Hz.

CABINET, MOTHERBOARD, and POWER SUPPLY assembled, burned in, and tested \$1198.19

50 Hz Export versions (specify voltage) Add \$ 30.00

Please see page 7 for information on optional front panel filler plates, disk regulator boards, back panel connector plates, and back panel cable sets.

NOTE: Due to weight restrictions, GIMIX MAINFRAMES with 5 1/4" drives installed and GIMIX 8" DISK CABINETS with drives installed cannot be shipped via UPS. At the customer's option we will ship these systems via UPS with the drives packed separately or via air freight (EMERY) collect, with the drives installed. Please specify the desired shipping method when ordering. Regardless of the shipping method chosen, all systems are assembled and tested as complete units before shipping.
TO ORDER BY MAIL: SEND CHECK OR MONEY ORDER OR USE YOUR VISA OR MASTER CHARGE. Please allow 3 weeks for personal checks to clear. U.S. orders add \$5 handling if order is under \$200.00. Foreign orders add \$10 handling if order is under \$200.00. Foreign orders over \$200.00 will be shipped via Emery Air Freight COLLECT, and we will charge no handling. All orders must be prepaid in U.S. funds. Please note that foreign checks have been taking about 8 weeks for collection so we would advise wiring money, or checks drawn on a bank account in the U.S. Our bank is the Continental Illinois National Bank of Chicago, 231 S. LaSalle Street, Chicago, IL 60683, account #73-32033. Visa or Master Charge also accepted.

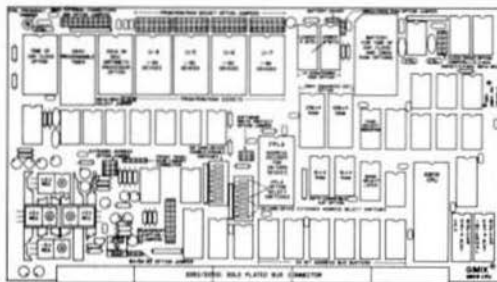
Be sure to add \$30.00 for each 50Hz power supply where needed.

GIMIX Inc. reserves the right to change pricing and product specifications at any time without further notice — GIMIX® and GHOST® are registered trademarks of GIMIX Inc. ©1982 GIMIX Inc.

GIMIX Inc. — 1337 WEST 37th PLACE • CHICAGO, ILLINOIS 60609 • (312) 927-5510 • TWX 910-221-4055

GIMIX 6809 CPU BOARD for the SS-50 BUS

The GIMIX 6809 PLUS CPU is an extremely versatile board that offers the user a great many features and options which make it an ideal choice for a variety of systems and applications.



- Any one of 3 memory management techniques can be used:
Straight Bank Select
GIMIX Enhanced DAT w/software write protect (optional)
SWTPC compatible DAT (required for SBUG-E) (optional)
- Software write protect in 4K blocks, of the entire address space (when GIMIX enhanced DAT is installed)
- Jumper selectable processor clock speeds (1, 1.5, 2 MHz)
- Separate buffers for the 6809 and the on card devices

- 4 PROM/ROM/RAM sockets for monitors and user software (up to 32K)
- PROM/ROM/RAM sockets individually jumper selectable for single or multiple supply voltage and 1, 2, 4 or 8K byte devices (Some FPLAs do not support 8K devices)
- 1K Bytes of scratchpad RAM
- 6840 programmable timer with provisions for external clock, gate and output connections
- Time of Day Clock (58167) w/Battery Backup
- 9511A or 9512 Arithmetic Processor w/Jumper selectable 2, 3, or 4 MHz clock speeds (optional)
- FPLA address decoding for the 8 on card devices 4 PROM/ROM/RAM sockets, 58167, 9511A/9512, 6840, 1K scratchpad RAM
- Software switching of address configurations for the 8 on card devices (allows software switching between on board PROM/ROM/RAM resident system monitors)
- All FPLA decoded devices can be individually enabled/disabled
- FPLA decoded devices are available for DMA access
- Extended addressing for the FPLA decoded devices (can be disabled)
- Software switching between on and off board system monitors using extended addressing
- Jumper selectable interrupts for the 6840, 58167, and 9511A/9512
- NMI input can be jumpered to the bus or to an external connector
- BA & BS jumper selectable for independent or gated operation
- User defined latch output
- Gold MOLEX connectors for trouble free contact
- SS-50 and SS-50C compatible
- Full DMA capabilities (works with any of the 6809 DMA methods)
- Full Slow memory capabilities
- Fully assembled, tested and burned in

NOTE: GIMIX 6809 CPU BOARDS do not include a baud rate generator. In systems that require a baud rate generator, it must be provided elsewhere. The GIMIX 6800/6809 mainframe includes a baud rate generator on the mother board.

2 MHz 6809 PLUS CPU #05 \$578.05

The GIMIX 6809 PLUS CPU board has a variety of other options that may be ordered at the time of purchase or added later. It is fully socketed to allow adding the following options at any time.

GIMIX ENHANCED Dynamic Address Translation \$35.00 SWTPC Compatible DAT (required for SBUG-E) \$15.00
1K CMOS Scratchpad RAM (1.5 MHz) Substitution \$ 8.00

ARITHMETIC PROCESSORS

9511A (32 bit math w/transcendentals) 4 MHz \$312.00 9512 (64 bit math only) 3 MHz \$265.00

GIMIX 6800 CPU BOARD

- 6800 MPU
- 4K EPROM (2708)
- 128 byte RAM
- 6840 Programmable timer (optional)
- DIP-switch EPROM addressing, compatible with most standard 6800 monitors.

..... \$224.03
With
6840 \$288.06
Baud Rate
Option Add \$ 30.00



THE UNIQUE GIMIX 80 x 24 VIDEO BOARD

Upper and Lower Case with Descenders • Hardware Scrolling
Contiguous 8 x 10 Character Cells • X-Y Addressable Hardware Cursor

IT IS THE ONLY VIDEO BOARD THAT GIVES YOU: A user programmable RAM character generator. Custom character sets, up to 128 characters each, can be stored and loaded into the board under software control, from disk, tape, etc. The ability to choose, under software control, 256 displayable characters from 384 available in the 3 on board (2 EPROM and 1 RAM) character generators.

The ability to divide the 256 displayable characters into 8 groups, according to both ASCII Code and bit 8, lets your program determine how each group is displayed. (Which character generator to use, and whether it will be normal or inverse video, full or reduced intensity or a combination of these.)

GHOSTability: to place multiple boards at the same address and access them individually without affecting the display of the other boards.

The ability to control all these features, on the fly, through software.

★ Fully decoded, occupies only 2K of address space.

★ Fully socketed — Gold bus connectors.

★ Assembled, Burned In, and Tested at 2MHz.

Deluxe Version with RAM Character Generator . . . \$458.76 Without RAM Character Generator . . . \$398.74
★ 50 Hz Versions Available ★

Versions of GIMIXBUG-90/FLEX and OS-9 that use the GIMIX 80 x 24 VIDEO BOARD in place of a serial terminal are available. These versions require a user supplied video monitor and parallel ASCII keyboard. Contact GIMIX for more information.

Also Available: For Use with Master Antenna Systems,
Our 64 or 32 x 16 Fully Interlaced, Uppercase Only, Video Board . . . \$198.71

GIMIX inc.

1337 WEST 37th PLACE
CHICAGO, ILLINOIS 60609
(312) 927-5510 • TWX 910-221-4055

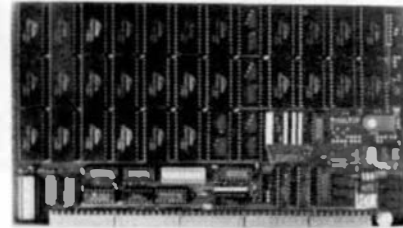


2MHz 64K BYTE STATIC RAM BOARD \$638.67

for 6800 and 6809 systems using the SS-50/SS-50C bus

Also available...

56K	\$578.57
48K	\$518.47
32K	\$398.37
24K	\$348.27



All versions have gold bus connectors and are fully socketed, assembled, burned in, and tested. Versions with less than 64K can be expanded at any time by adding additional RAM chips.

FEATURES:

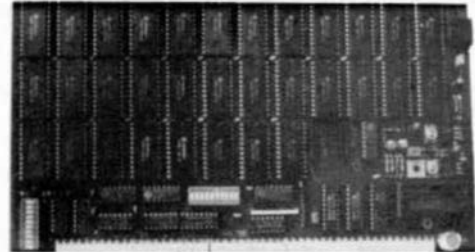
- ★ ADDRESSABLE in two 32K sections with separate regular and extended address decoding for each section. Each section can be addressed to any 32K boundary in the address range (1M Byte with extended addressing). Each 32K section is divided into four 8K blocks that can be individually enabled or disabled. Disabled sections do not occupy address space.
- ★ FULLY STATIC MEMORY does not require complicated refresh timing or clocks for data retention. Compatible with any of the 6800/6809 DMA techniques.
- ★ GUARANTEED 2MHz. OPERATION uses high speed (200 ns.) memory with no wait states or clock stretching required.
- ★ LOW POWER NMOS RAM requires less than 3/4 AMP (750 ma) typical at 8V. for a fully populated 64K board.

Also available...

NON-VOLATILE 64K BYTE CMOS STATIC RAM BOARDS with BATTERY BACK-UP

With all the versatility of the above boards... PLUS!

- ★ NON-VOLATILE MEMORY with built in battery back-up. Retains data even with system power removed. With the battery fully charged, data remains intact for a minimum of 2 1/2 days.
- ★ ULTRA-LOW POWER CMOS RAM requires less than 1/4 AMP (250 ma.) typical at 8V for a fully populated 64K board.
- ★ LOW BUS VOLTAGE DETECTION inhibits memory access during power up and power down to prevent false writes to the memory.
- ★ WRITE PROTECT SWITCH permits the entire board to be write protected for PROM/ROM emulation and software debugging.



64K..\$798.64 — 56K.. \$728.56 — 32K..\$518.36

All above RAM Boards are guaranteed for 2MHz operation.

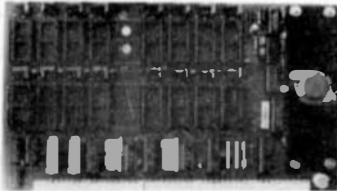
16 SOCKET EPROM / ROM / RAM BOARD

WITH EXTENDED ADDRESS DECODING

For Use With: Existing SS50 Systems and SS50C Extended Address Systems

FEATURES: Up to 128K on a single board (using 8K devices)

Can be used with 2, 4, and 8K 24 pin, 2716/2516 pinout, single supply voltage EPROMs and most pin-compatible ROMs and static RAMS.



- Device sizes and types can be mixed on the same board
- 2 separate 8 socket sections
 - DIP-switch selection of base address for each section
 - Individual address decoders for each section, including extended address decoding
 - Bi-polar PROMs for address decoding allow mixing of device sizes within a section
 - Separate slow memory generation for each section. (6809 only)
- Each socket is jumper programmable for device size and type (2, 4 or 8K PROM/ROM/RAM)
- Fully Buffered • Fully Socketed • Gold Bus Connectors

ASSEMBLED, BURNED-IN, AND TESTED

\$238.32



8K PROM BOARD

\$98.34

- Holds eight 2708 or 2708-compatible ROMS.
- DIP-switch addressable to any 8K boundary.
- Gold Bus Connectors

HIGH RESOLUTION BIT MAP GRAPHICS BOARD SET

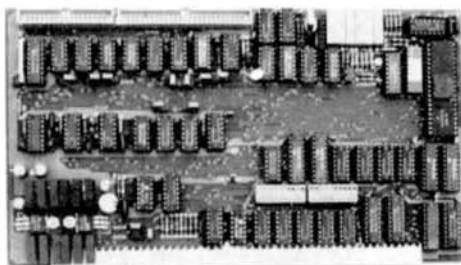
FEATURES: — 512 x 512 Dot resolution — A board set consisting of the Graphics Controller Board and the Screen Memory Board (32K of memory) — Does not tie-up the processor or system bus for screen refresh — Occupies 8K of address space plus 8 bytes for control ports — Separate DIP-switch selection for screen memory and control port addressing — GHOSTability allows multiple boards to be placed at the same address and be enabled/disabled under software control — Extended address decoding for SS50C extended address lines

ASSEMBLED BURNED IN AND TESTED

\$996.77

NOTE: This Graphic Board Set requires a high resolution video monitor such as the MOROTOLA M4408 with a 30KHz horizontal scan rate.

GIMIX inc. 1337 WEST 37th PLACE • CHICAGO, ILLINOIS 60609 • (312) 927-5510 • TWX 910-221-4055



GIMIX DMA DOUBLE DENSITY DISK CONTROLLER #68

The GIMIX DMA (Direct Memory Access) DISK CONTROLLER has the capabilities needed to realize the full potential of today's sophisticated multi-user/multi-tasking operating systems such as OS-9™ and UniFLEX™.

HIGH SPEED using bi-polar logic DMA circuitry for guaranteed operation at 2MHz. DMA transfers take place at full bus speed using 6809 cycle steal DMA. Once the required parameters are passed to the controller and DMA transfer is initiated the processor is free for other tasks. Interrupts can be generated to indicate the completion of the transfer.

SINGLE AND DOUBLE DENSITY data storage on any combination of 5 1/4" and 8" floppy disk drives; single and double headed, single and double track density, up to 4 drives total.

LOW ERROR RATES are insured by a data recovery circuit (data separator) and adjustable write precompensation circuitry for drives that require precomp. Separate precomp adjustments are provided for 5 1/4" and 8" drives.

ADDRESSABLE to any 8 byte boundary in the address space (1M byte when extended address decoding is used). The board occupies only 8 bytes of address space.

EXTENDED ADDRESSING control using the SS-50C extended address lines. Control of the extended address lines allows the board to perform DMA transfers to and from any address in the 1M byte address space.

FULLY BUFFERED with separate 5 1/4" and 8" output buffers and schmidt trigger input buffers for the disk drive signals.

The DMA controller leaves the processor free to perform other tasks once the transfer is initiated, unlike programmed I/O disk controllers which require full time use of the processor during data transfers to and from disk.

This is extremely important in a multi-user/multi-tasking environment as the processor can perform other tasks such as console I/O while a disk transfer is in progress.

#68 fully assembled, burned in, and tested \$588.68

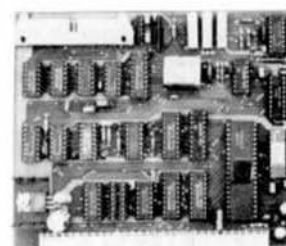
GIMIX DOUBLE DENSITY PIO DISK CONTROLLER #28

The GIMIX DOUBLE DENSITY PIO (PROGRAMMED I/O) DISK CONTROLLER is a versatile floppy disk interface for use in 6809 systems on the SS-50 or SS-50C bus. The board physically occupies one slot of the 30 pin I/O bus.

- Double the unformatted storage capacity of single density controllers
- Single and double density operation
- Phase lock data recovery circuit (data separator)
- Adjustable write precompensation (precomp)
- Controls up to four 5 1/4" drives
- Controls single and double headed drives
- Designed to meet the data hold-time requirements of the Western Digital 1797 floppy disk controller I.C.

The GIMIX DOUBLE DENSITY PIO DISK CONTROLLER is ideal for systems that require greater data storage than that provided by single density controllers, without increasing the number or type of drives. In most cases existing 6809 systems can be upgraded by adding only the controller and the appropriate operating system software.

#28 fully assembled, burned in and tested \$298.28



GIMIX 5/8 DISK CONTROLLER BOARD #58

The GIMIX 5/8 DISK CONTROLLER is a versatile floppy disk interface for use with both 6800 and 6809 systems on the SS-50 or SS-50C bus. The board physically occupies one slot of the 30 pin I/O bus.

- Hardware and software compatible with existing disk controllers (SWTPC DC-1, DC-2 and DC-3)
- Controls up to four 5 1/4" drives in 6800 systems
- Controls any mix of 5 1/4" and 8" drives, up to four drives total, in 6809 systems
- Provides for double headed drives
- Synchronous data separator for data reliability
- Designed to meet the data hold-time requirements of the 1771 floppy disk controller I.C.

The GIMIX 5/8 DISK CONTROLLER is ideal for a variety of applications including the replacement of controllers in existing systems. As a replacement it can provide the added advantages of a data separator, double headed drive capability, and in 6809 systems the ability to use 8" drives. Double headed drives and 8" operation may require appropriate operating system software.

#58 fully assembled, burned in, and tested \$226.58

ALSO As above, but for 5 1/4" drives only **\$198.48**

AVAILABLE: As above, but without 1771, tested, not burned in **\$158.38**

NOTE: When ordering disk controllers please specify the make and model of the drives being used.

5 1/4" DRIVES INSTALLED IN GIMIX SYSTEMS with all necessary cables

	SINGLE DENSITY		DOUBLE DENSITY		
	Formatted	Unformatted	Formatted	Unformatted	
40 track (48TPI) single sided	199,680	250,000	341,424	500,000	2 for \$700.00
40 track (48TPI) double sided	399,360	500,000	718,848	1,000,000	2 for 900.00
80 track (96TPI) single sided	404,480	500,000	728,064	1,000,000	2 for 900.00
80 track (96TPI) double sided	808,960	1,000,000	1,456,128	2,000,000	2 for 1300.00

CHART SHOWS TOTAL CAPACITY IN BYTES FOR 2 DRIVES.

SOFTWARE AVAILABLE FOR GIMIX DISK SYSTEMS

GIMIX VERSIONS OF TSC's 6809 FLEX operating systems are available for all three GIMIX disk controllers. They fully support all the features of each controller and are software compatible with other versions of FLEX. GIMIX FLEX includes a disk FORMAT program that allows the user to pick the number of tracks to format, single or double sided disks, and where appropriate single or double density. It also supports both single (48 TPI) and double (96 TPI) track 5 1/4" drives and allows 80 track (96 TPI) drives to read, write, and format 40 track (48 TPI) disks. FLEX is single user and limited to 56KB systems.

Specify controller and type of drive: 8"; or 5 1/4" 40 or 80 track \$90.00

NOTE: FLEX requires a system monitor (e.g. GMXBUG or S-BUG E). When used with a SWTP CPU and S-BUG E and the GIMIX #68 DMA CONTROLLER, the GIMIX BOOTSTRAP PROM is also required.

GMXBUG 09 includes advanced debugging capabilities as well as utility and memory manipulation routines. The standard terminal based version can be upgraded to video based for use with the GIMIX 80 x 24 Video board by changing the bootstrap PROM to the Video/Bootstrap Prom. It can be used with either GIMIX DAT or SWTP DAT, but they are not required.

Price includes PROMs, Manual, and Source listing (Specify DAT) \$98.65

Video/Bootstrap or Bootstrap PROM only (Included w/GMXBUG) \$30.00

GIMIX' versions of MICROWARE's OS-9 Level 1 are available for all GIMIX disk controllers. OS-9 includes PROMS and Disk. Microware's OS-9 Debugger is also included. Level 1 is multi-user, but limits user to 56KB Specify controller and type of drive: 8"; or 5 1/4" 40 or 80 track \$195.00

★ **SYSTEM SPECIAL** ★ GIMIX offers you GMXBUG/FLEX/OS-9 selectable under software control. See System prices elsewhere in this brochure.

UNIFLEX is available for GIMIX Systems using the GIMIX 6809 CPU board and the #68 DMA Controller with 8" drives. It requires a minimum of 128KB of RAM. A signed license agreement with TSC is required before shipping. The SWTP DAT parts must be installed on the GIMIX CPU.

UNIFLEX \$550.00 GIMIX boot PROM for UNIFLEX \$50.00

MICROWARE's OS-9 Level 2 requires a minimum of 128KB of RAM. The GIMIX DAT parts must be installed on the GIMIX CPU. GIMIX versions of Level 2 also include the Debugger (To be available soon) \$495.00

A WIDE VARIETY OF LANGUAGES AND OTHER SOFTWARE IS AVAILABLE FOR THESE 6809 DISK OPERATING SYSTEMS

FOR MICROWARE'S OS-9 LEVEL 1 & 2:

Macro Text Editor	\$125.00	CIS COBOL	\$895.00	OS-9 PASCAL	\$400.00
OS-9 Assembler	125.00	Forms 2 Option	200.00	OS-9 C Compiler (Available Soon)	400.00
BASIC09	195.00				

FOR TSC'S FLEX

6809 Native-Code Pascal Compiler	\$200.00	Sort/Merge	\$ 75.00	Standard Basic Precompiler	\$ 50.00
Basic	75.00	6809 Debug Package	75.00	Extended Basic Precompiler	50.00
Extended Basic	100.00	6809 Diagnostics Package	75.00	6809 FLEX Utilities	75.00
Text Processing System	75.00	6809 Assembler	50.00	68000 Cross Assembler	250.00
Text Editing System	50.00				

FOR UNIFLEX

UnifLEX Operating System (6809)	\$550.00	UnifLEX Sort/Merge	\$150.00	Fortran 77 (requires relocating assembler)	\$350.00
UnifLEX Basic	200.00	UnifLEX Pascal	300.00	6809 Relocating Assembler & Linking Loader	175.00
UnifLEX Basic Precompiler	150.00	UnifLEX 68000 Cross Assembler	300.00	Fortran & Relocating Assembler (pkg. deal)	450.00
UnifLEX Text Processor	150.00	Enhanced Printer Spooler	150.00		
C Compiler (Requires relocating assembler, available soon)	400.00	C Compiler & Relocating Assembler			500.00

1 Year Maintenance included on all Uniflex Prices.

The above software is from MICROWARE and TSC. Numerous offerings of languages (e.g. C, PASCAL, FORTH), utilities (e.g. spelling dictionaries, cross assemblers, disassemblers) and application packages (e.g. word processing, data base management, accounting), are available from many other software houses.

8" DISK CABINET and POWER SUPPLY. The cabinet features the same quality, styling, and finish as the GIMIX MAINFRAME and mounts two standard size 8" floppy and/or winchester disk drives. It will also hold 4 thinline 8" floppys or a combination of 2 thinline floppys and an 8" winchester.

To provide an easy means of controlling the power to an entire system from one switch, three accessory outlets, one for the computer and two for peripherals (terminals, printer, etc.), are provided. The back panel mounted power switch selects either OFF, ON, or the AUTO mode. In the AUTO mode, the power supply and two of the accessory outlets are controlled by the computer (or other device), connected to the third accessory outlet. When the computer is turned on or off, the cabinet senses the presence or absence of current flow to the computer and turns itself and the other accessory outlets on or off. Circuitry is also provided to turn AC drive motors ON and OFF under computer control. A built in fan with a washable air filter provides cooling for the power supply and drives. The back panel is punched for 4 connectors (two 50 and two 20 pin) for connections between the cabinet and the computer.

The power supply uses a constant voltage Ferro-resonant transformer for reliability and protection against brownouts and power line noise. It provides +5 Volts at 6 Amps, +24 Volts at 6 Amps, and -5 Volts at 750 Ma. continuously; with ample surge capacity for drives that require higher starting currents. The supply has two separate 24 V. outputs that can be sequenced to delay starting of the second drive until the first is up to speed.

All units are fully assembled, burned in, and tested.

8" DUAL DRIVE DISK SYSTEM: includes two double sided 8" disk drives, cabinet, power supply, and all necessary cables to connect to a GIMIX MAINFRAME or controller (see shipping notes on page 8) ~~\$2698.80~~

8" DISK CABINET ONLY: Includes power supply and AC & DC power cables. Note: Because different drive models require different AC & DC connectors, be sure to specify the quantity and model number of the drives being used when ordering. \$848.18

For 50 Hz Export power supply, add \$ 30.00

DRIVE CABLE: for 8" floppy drives includes connectors for the disk drives and a back panel connector for the 8" disk cabinet.

with 2 drive connectors \$44.82

with 4 drive connectors \$67.84

MAINFRAME CABLE: for use with the above cable; to connect the disk cabinet to GIMIX MAINFRAMES and disk controllers \$45.81

8" FILLER PLATE: used when only one drive is installed \$14.83



GIMIX 2MHz INPUT / OUTPUT BOARDS

SERIAL INTERFACE BOARDS All GIMIX serial interface cards use the versatile 68B50 programmable ACIA that provides software control over: number of data bits, parity, stop bits, and interrupts; plus a full set of error and status flags. They all feature RS-232 compatible input/output with RTS, CTS, and DCD handshake signals. The GIMIX SINGLE PORT serial interface also has 20 Ma. current loop output for use with GIMIX RELAY DRIVER BOARDS, teletypes, etc.

All serial boards have gold plated, header type connectors for corrosion resistance and reliable operation.

PARALLEL INTERFACE BOARDS All GIMIX parallel boards use the 6821 PIA for compatibility and versatility. Each 6821 provides two 8 bit ports with a variety of handshake and interrupt generation modes.

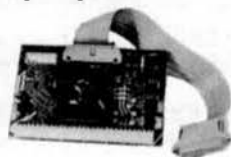
Optional cable sets are available to provide 25 pin "D" type data connectors for back-panel mounting.

SINGLE PORT SERIAL INTERFACE

(For the 30 pin I/O bus) **\$88.41**

DIP-switches provide full control over I/O and handshaking configuration — easily accessible, no soldering necessary for:

- RS-232 or Current Loop select
- One of five baud rates or an external clock
- Optional connection to the Interrupt Request line
- Override of the DCD and CTS modem control signals



On-card regulators for +5, +12, and -12 volts provide power at the connector for modems, cassette interfaces, etc.

RS-232 and current loop drivers and receivers keep output from the GIMIX Serial Interface powerful and clean.

OTHER FEATURES INCLUDE:

- Modem Control Signals — has data carrier detect and clear to send inputs.
- Cassette Interface Control — has a diode-protected external clock input and a separate clock output. • Secondary RS-232 input and output channels
- Current loop input and output • Reader Control output • Request to send output

2 PORT SERIAL INTERFACE (For the 30 pin I/O bus) **\$128.43**

Solderless jumpers provide easy selection and changing of options.

FEATURES:

- 2 separate RS-232 ports (with handshake) on a single board
- Jumper programmable connector pinouts for easier connection to external devices. (Connector can be programmed as DCE or DTE)
- Provides direct plug-in of standard RS-232 connectors when used with optional GIMIX cable sets.
- Individual baud rate and interrupt select jumpers for each port.
- Selectable for use with 4, 8, or 16 addresses per slot.

8 PORT SERIAL BOARD

(For the 50 pin bus) **\$318.46**

The GIMIX 8 PORT SERIAL INTERFACE has 3 header type connectors for external connections. The center connector provides Transmit Data, Receive Data, and signal ground for all 8 ports. The outer 2 connectors each provide TX, RX, and signal ground as well as the 3 handshake lines RTS, DCD, and CTS for 4 ports.

FEATURES:

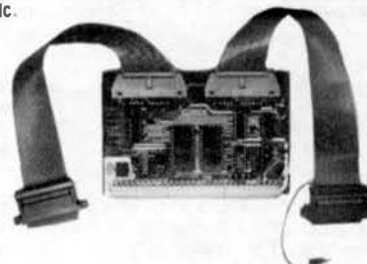
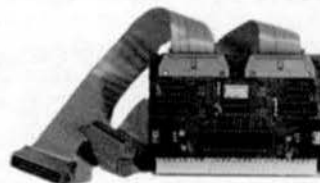
- 8 separate RS-232 ports (with handshake) on a single 50 pin board
- Extended address decoding for the SS50C bus
- Occupies only 16 bytes of address space
- DIP-switch addressable to any 16 byte boundary
- Individual DIP-switch selectable baud rates and interrupts for each port
- On board baud rate generator for baud rates from 75 to 38.4K baud

TWO PORT PARALLEL INTERFACE CARD

(For the 30 pin bus): **\$88.42**

EACH PORT HAS:

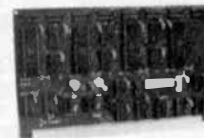
- ✓ Eight data I/O lines — fully buffered, with Schmidt-trigger inputs for high noise immunity
- ✓ DIP-switch selection of either input or output
- ✓ Its own buffered input handshaking line
- ✓ Its own buffered output handshaking line that is strappable for input.
- ✓ DIP-switches for connecting to the interrupt Request or the Non-Maskable Interrupt lines.
- ✓ Its own professional-quality gold-plated header connector
- ✓ Gold Bus Connectors
- ✓ Its own DIP-socket for connecting to boards that need an external 8-bit or output port such as the GIMIX Opto board.
- ✓ On-card regulators for +5 and -12 volts provide power at the connectors for keyboards, tape readers, etc.



8 PORT PARALLEL INTERFACE BOARD

(For the 50 pin bus) **\$198.45**

- Eight 8 bit parallel ports on a single board
- Four 6821 PIAs
- 3 ports buffered for output
- 5 ports bi-directional (not buffered)
- Built in interrupt generator outputs 1 second or 1 minute interrupts
- Occupies 16 bytes of address space
- DIP-switch addressable to any 16 byte boundary



CABLE SETS FOR ALL ABOVE BOARDS . . . ea. **\$22.95**

Cable sets include: Ribbon cable with a matching connector for the I/O board, a 25 pin "D" type data connector for back panel mounting, and mounting hardware.

(Please specify which board when ordering cable sets)

GIMIX UNIVERSAL SYNCHRONOUS & ASYNCHRONOUS SERIAL I/O BOARDS.

This 30 pin board is available in three versions: with a 68B50 ACIA, a 68B52 SSDA (Synchronous Serial Data Adapter) or a 68B54 ADLC (Advanced Data-Link Controller). Control logic is provided for loop mode operation of the 68B54 ADLC. All three feature jumper selectable RS-232C or RS-423 (single-ended), or RS-422 (Differential) line drivers and receivers for the Receive data, transmit data, external clock, and handshake signals. External connections can be made through the 26 pin header at the top of the board or, when used with an optional GIMIX cable set, a 25 pin "D" type data connector. The jumper programmable I/O connector pinouts can be arranged to suit a variety of interface configurations.

with 68B50 ACIA (\$244.50) with 68B52 SSDA (\$254.52) with 68B54 ADLC (\$268.54)



GIMIX inc.

1337 WEST 37th PLACE
CHICAGO, ILLINOIS 60609
(312) 927-5510 • TWX 910-221-4055

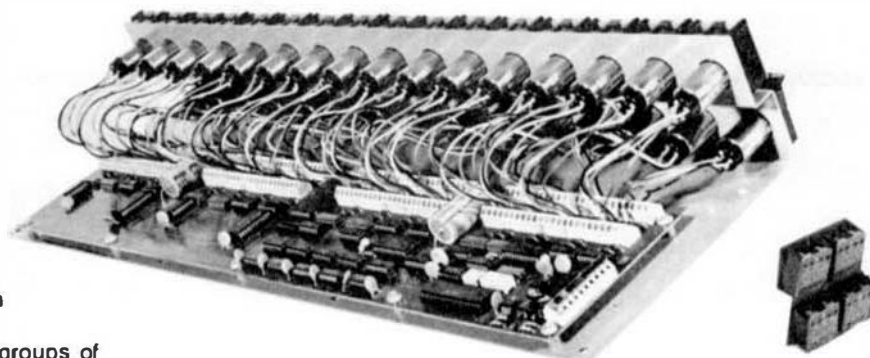
**Control 31 Separate
AC Circuits (20 amps max. ea.)
RELAY
DRIVER BOARDS
FOR A.C.
POWER CONTROL**

4 Boards (124 relays) can be connected to one 20 ma. current loop. Each board controls 31 G.E. RR8 relays.

Use multiple serial ports for additional groups of 124 relays.

SIMPLE TO CONNECT Only two pairs of wires coming from your computer are needed for each set of four Relay Driver Boards, these wires may be the standard telephone type.

REMOTELY LOCATABLE. Relay Driver Boards can be conveniently located for A.C. power distribution — away from the computer and other Relay Driver Boards. The board operates in either the active or the report mode, as specified by the computer. In the active mode, the board interprets the 8-bit data received as a command to turn on or off a particular relay. Following a brief interval to allow the selected relay to operate, the board senses that relay's status (on or off). If the status is other than expected, the computer takes appropriate action, as determined by the program. A command received in the report mode has the same results, except for relay activation. This allows the mode to check relay status at any time.



If the on-board UART detects a transmission error, such as in framing, parity, or overrun, no relays are activated and no status scan occurs.

Clamping terminal blocks for wiring simple SPST-N.O. momentary contact remote switches to individual relays or groups of relays, both on and off, provide manual control as in a normal low voltage switching system, even without the computer. In event of power failures, the relays will remain in the same state that they were in when power is restored. DATA rates up to 1200 baud, allow operating up to 120 relays per second on each port.

COMPACT — Only 24" x 5"

Distances and operation of boards and relays are dependent upon wire length and gauge, and type of transformer.

RELAY DRIVER BOARD ACCESSORIES

MOUNTING BRACKET ★ custom designed to hold a Relay Driver Board and 31 relays. The bracket (26" x 8 1/4" x 4") and transformer will fit in a standard electrical cabinet (extra room needed for wiring) creating a neat and easily installed system.

TRANSFORMER ★ 2 Amp., 24 volts. Custom manufactured to our specs for powering a Relay Driver Board and 31 G.E. RR8 relays.

G.E. RR8 RELAYS ★ 24 volt, split coil, mechanical latching type. Once ON they stay ON (drawing no current) until they are powered OFF, and vice-versa. Each relay can handle 20 AMPS for switching lights, motors, machinery, etc. up to 277 V.A.C. — UL listed.

PRICES

RELAY DRIVER BOARD ONLY	\$488.86	TRANSFORMER	\$ 14.24
BRACKET	\$ 38.21	RELAY DRIVER PACKAGE	\$1083.08

(Relay Driver Board, 31 RR-8 Relays, Bracket and Transformer)

OPTO-BOARD FOR REMOTE SENSING \$348.85

Links any computer to 34 Outside-World Signals safely
Inputs isolated to 1500 volts
Perfect for detecting closure of switches and relays
Built-in Debouncing.
Signals may range from 5 to 24 volts D.C.
Can detect signals sent by devices such as wall switches, hidden floor switches, electric eyes, alarms, smoke detector, thermostats, and a multiplicity of other applications.

All switch ports are constantly scanned by an on-board circuit. No processor time is required. A built-in memory buffer saves up to 64 closed-switch signals, permitting the processor to complete lengthy tasks between interruptions.

FULL HANDSHAKING LOGIC:

DATA READY output DATA ACCEPTED input

BUFFER FULL output RESET input

ALL OUTPUTS ARE BUFFERED AND TTL COMPATIBLE

PARTS AND CABLE SETS FOR GIMIX BOARDS AND SYSTEMS

BAUD Rate Generator Board	\$88.93	5" Disk Cable Set	\$34.96
GIMIX double disk regulator with two 4 amp regulators to provide power for 5 1/4" drives	68.22	I/O Cable Set, each (specify board)	22.95
Filler plates (when no 5" drives are used), 2 required	14.92	GIMIX 2" D Ring Binder	9.00
Missing Cycle Detector	38.23	GIMIX 3" D Ring Binder	12.00
8" Disk Cable and Back Panel Connector Set	29.25	OPTIONAL Back Panel Connector Plates for Mainframe Choice of: Blank; SO-239; BNC; 20 & 50 Pin Header; 34 & 40 & 50 Pin Header. Connectors not included.	8.60
8" Disk Cable Set	44.26		

GIMIX 50 PIN PROTOTYPING BOARD

- Double sided with plated thru holes and gridded power and ground lines.
- 16 rows of pads on .100 x .300 centers: up to 72 fourteen pin ICs.
- Accepts standard 6, 8, 14, 16, 20, 24, 28, and 40 pin DIP devices.
- The entire top edge has pads for .100 x .100 header (ribbon) connectors.
- Pads for solder connections or .100 center headers on all 50 bus lines.
- Accepts 4 TO-220 regulators; 2 on the +8V & 1 ea. on the + / - 16 V lines.
- Provisions for decoupling caps distributed throughout the array.
- Can be used with wire wrap, wiring pencil, solder wiring, etc.

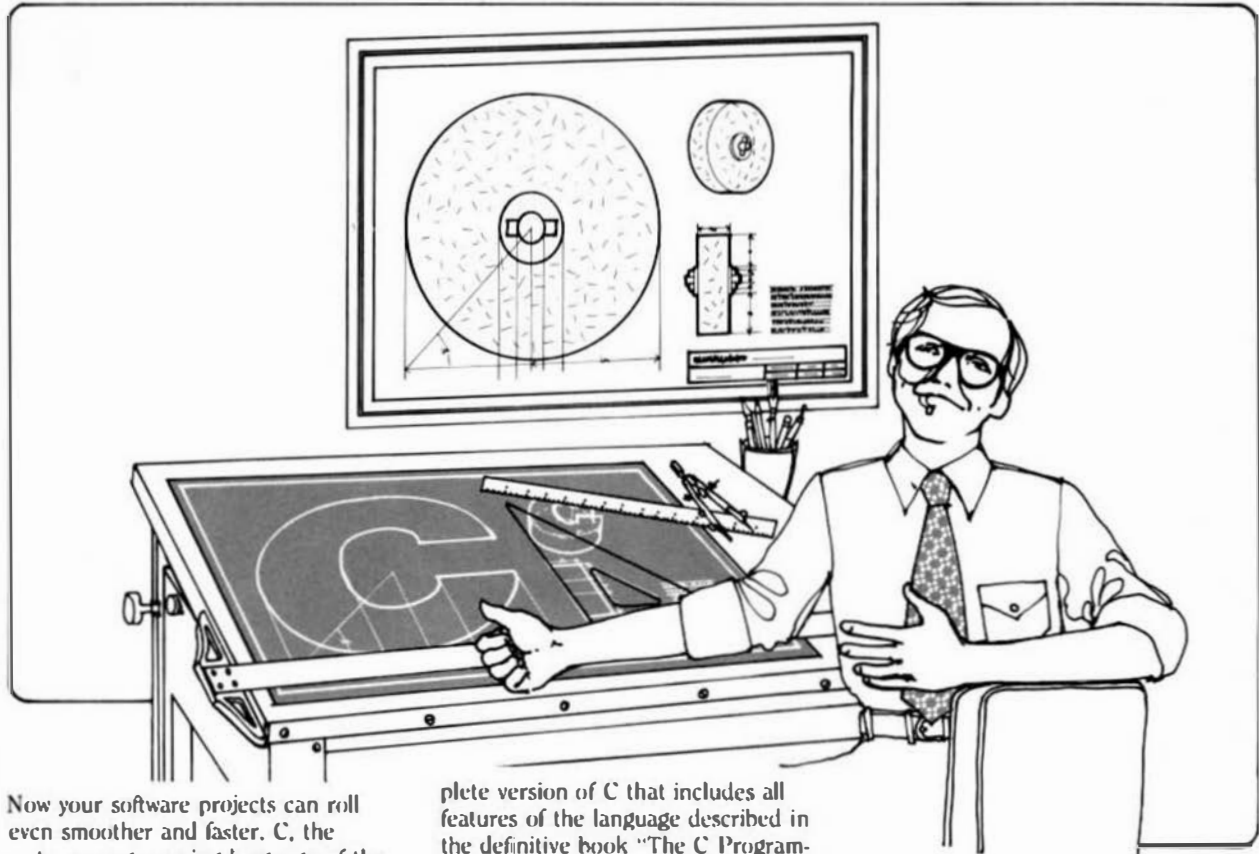
With gold bus connectors and heat sinks — unassembled \$56.66

GIMIX inc.

1337 WEST 37th PLACE • CHICAGO, ILLINOIS 60609 • (312) 927-5510 • TWX 910-221-4055

C:

The Greatest Invention Since The Wheel



Now your software projects can roll even smoother and faster. C, the systems programming language of the future, is here today for Microware's OS-9 Operating System. Professionals rave about C because it's a structured language that can handle the most demanding real-time applications or painlessly produce simple system software.

When performance counts . . .

Few languages can match C's outstanding ability to produce fast, compact native code. In fact, it is one of a very few languages that is truly efficient enough to be used to produce operating systems, critical real-time programs, and compilers. Because of the richness and variety of C operators and the way they naturally combine, complex functions require less code. Plus the 6809 architecture makes it a superior C machine.

Complete and standard . . .
Microware's new C compiler is a com-

plete version of C that includes all features of the language described in the definitive book "The C Programming Language" by Brian Kernighan and Dennis Ritchie. OS-9 C features: preprocessor with conditional compilation; complete standard function library; char, int, long, and float data types; pointers, register variables, arrays, structures, and unions; one-pass compilation; and assembly language source code output.

The bridge to Unix and the future . . .

Because Microware's C compiler has essentially all features of Unix C, and because the OS-9 operating system is a Unix-type operating system, C programs readily move between OS-9 and Unix. And it is becoming apparent that C will be the preferred programming language for all popular 16-bit microcomputers. As a result, software written in C is inherently protected against processor obsolescence and is assured port-

ability to all latest-generation microprocessors including the 68000.

Plus the OS-9 connection . . .

C is the latest member of the broadest line of 6809 software tools in the industry: Microware's OS-9 family. All OS-9 system functions are directly callable from C programs. The C compiler utilizes the standard OS-9 Text Editor and Assembler, and can process data files used by Basic09, Pascal, and Cobol.

Write or call for our free catalog. We accept phone orders and MasterCard and VISA orders.

Unix is a trademark of Bell Telephone Laboratories.
OS-9 is a trademark of Microware Systems Corp.



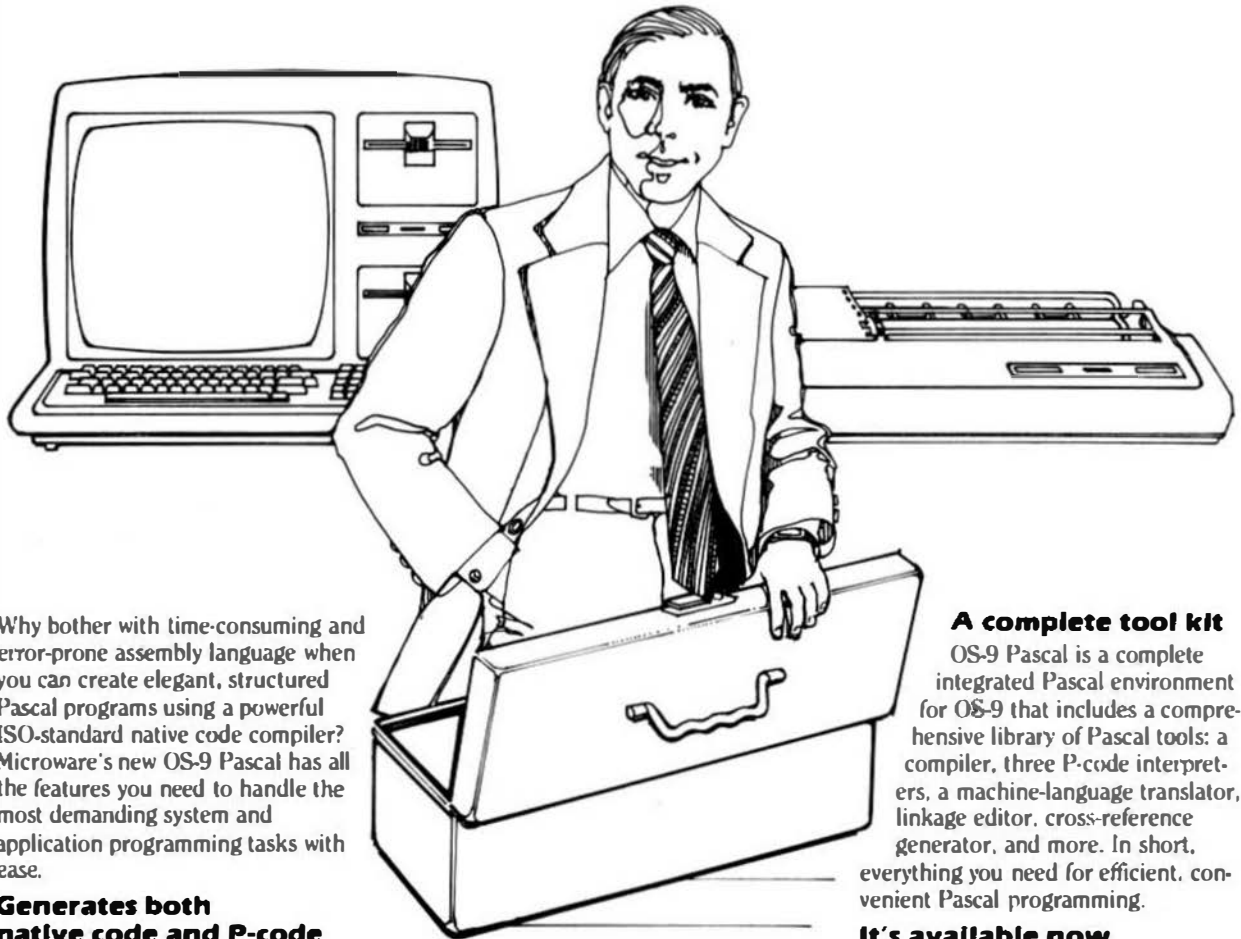
MICROWARE.

Microware Systems Corporation
5835 Grand Ave., Des Moines, IA 50312
(515) 279-8844 Telex 981-520-2535

OS-9 Seminar May 14-16, 1982 Contact MICROWARE For Further Information

OS-9 PASCAL™

A New Programming Tool For Experts



Why bother with time-consuming and error-prone assembly language when you can create elegant, structured Pascal programs using a powerful ISO-standard native code compiler? Microware's new OS-9 Pascal has all the features you need to handle the most demanding system and application programming tasks with ease.

Generates both native code and P-code

With OS-9 Pascal you don't have to make that difficult choice between easy-to-use P-code Pascal or fast native-code Pascal. You can compile your Pascal program to pure 6809 assembly language source code. OS-9 Pascal performs extensive local and global code optimization which results in incredibly fast and compact machine language programs. Or if you prefer, OS-9 Pascal can generate P-code for interpretive execution to simplify program debugging and testing. There's also a Virtual Memory P-code Interpreter that can run huge Pascal programs that other microcomputers can't touch. In fact, you can run programs using any combination of P-code, compiled machine language, or handwritten assembly language procedures.

ISO Standard Pascal Plus

OS-9 Pascal conforms to the ISO industry standard for Pascal, so you are assured of portability to or from any other computer that uses standard Pascal. OS-9 Pascal protects your software investment and gives you access to a vast body of existing Pascal software. Beyond the standard, we've added natural extensions to OS-9 Pascal to make it even more versatile, such as: relaxed identifier syntax; separate procedure compilation; random access file and interactive I/O; bitwise logical operators; run-time error handling; and much more. And because it runs under OS-9, it is inherently multiuser and multi-tasking.

A complete tool kit

OS-9 Pascal is a complete integrated Pascal environment for OS-9 that includes a comprehensive library of Pascal tools: a compiler, three P-code interpreters, a machine-language translator, linkage editor, cross-reference generator, and more. In short, everything you need for efficient, convenient Pascal programming.

It's available now

OS-9 Pascal is now available *off-the-shelf* in all OS-9 disk formats. It can be used on any disk-based 6809 computer running OS-9 Level One or Level Two. Each OS-9 Pascal package includes the compiler, machine language translator, P-code interpreters, run-time support packages, linkage editor, demonstration programs, and a comprehensive 120-page User's Manual. Write or call for our free catalog. We accept phone orders and MasterCard and VISA orders.

OS-9 Pascal and OS-9 are trademarks of Microware.



MICROWARE.

Microware Systems Corporation
5835 Grand Ave., Des Moines, IA 50312
(515) 279-8844 Telex 910-520-2535

OS-9 Seminar May 14-16, 1982 Contact MICROWARE For Further Information

CIS COBOL™

The Natural Choice For Business Software



COBOL has been the universal business programming standard for nearly two decades. COBOL is rich in commercially-oriented facilities. It has powerful file handling, formatted printing, and data structure capabilities. It is English-like, so that programs are easy to read and maintain. By far, most organizations use COBOL as their main business programming language. One effect of this is that more professional business programmers know and use COBOL, and the best business application software is written in COBOL.

Microware has developed the 6809 version of Micro Focus's proven CIS COBOL compiler to allow you to run ANSI 1974 standard COBOL on your OS-9 based computer system. It's been certified as such by the U.S. General Services Administration, following stringent testing. This assures that CIS COBOL is compatible with stand-alone minicomputer or mainframe COBOLs. And CIS COBOL has been proven on thousands of micro and mini systems all over the world.

Stability is an important advantage

of COBOL. Unlike some other languages, a firm standard has been established. Because of this, COBOL programs can be transferred from one machine to another with a minimum of modifications. COBOL users can take advantage of the mass of existing programs written in COBOL.

CIS stands for Compact, Interactive, and Standard—the most desirable qualities for microcomputer COBOL. And CIS COBOL offers you much more! It has been specially designed for interactive operation and efficient use on small computers. CIS COBOL has multi-user capability that allows more than one COBOL program to be run simultaneously. CIS COBOL extensions for conversational applications, screen control, interactive debugging, and OS-9's device-independent I/O system.

CIS COBOL's optional FORMS 2 program generator eliminates the need to write simple data entry and inquiry programs. It lets you build a

screen layout on line at the CRT, then automatically generates COBOL source code programs from your screen definitions. Or you can use it to create the interactive screen handling portions of more complex programs.

CIS COBOL and FORMS 2 can be used with any disk-based 6809 computer system having at least 48K of user RAM running Microware's OS-9 Level One or OS-9 Level Two operating systems.

If you need to create business applications, COBOL is your natural choice. And if you want to run COBOL on your 6809 system—or want easy to use interactive business programming facilities—that means 6809 CIS COBOL.

Write or call for our free catalog. We accept phone orders and MasterCard and VISA orders.

CIS COBOL is a trademark of Micro Focus, Inc.
OS-9 is a trademark of Microware.



MICROWARE

Microware Systems Corporation
5835 Grand Ave., Des Moines, IA 50312
(515) 279-8844 Telex 910-520-2535

OS-9 Seminar May 14-16, 1982 Contact MICROWARE For Further Information

EPSON DOT MATRIX PRINTERS

The Epson MX-80

The Epson MX-100



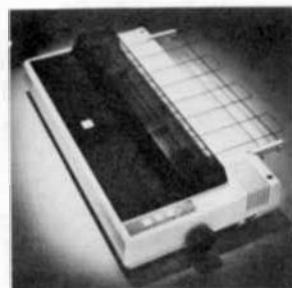
80-Column
\$495.00

MX-70

\$395.00

MX-80 FT

\$625.00



136-Column
\$798.00

FACTORY FRESH — LATEST PRODUCTION — BRAND NEW

SWTPC-Motorola, MP32 Dynamic Memory Board

ONLY \$199.00

Assembled & Tested

Shipping - Disk Drives or Cabinets with Power Supply, Add \$7.50 each

Memory Boards or Cables, Add \$4.50 each

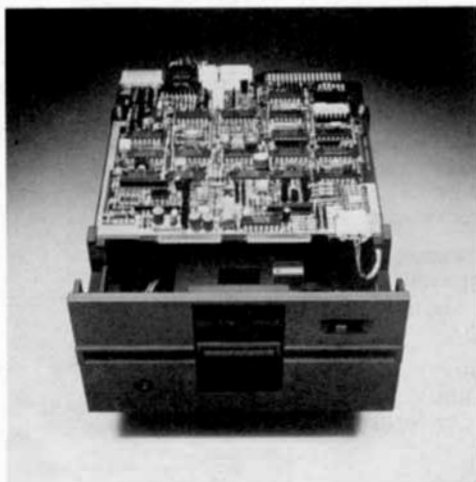
Printers - Epson Add \$7.50
Other Freight C00

Thousands sold at \$650.00 Save over \$450.00

1 MHZ - No extended addressing

Can be set up for \$0-7FFF or 8000-FFFF

Limited Quantity (less than 50)



**** DISK DRIVES & CABINETS W/PS ****

5 1/4"

TEAC - Single Sided, Double Density, 40 Track.....\$249.95

TEAC - Double Sided, Double Density, 40 Track.....\$349.95

CABINET - Single Drive with Power Supply.....\$ 79.95

CABINET - Double Drive with Power Supply.....\$ 99.95

CABLE - Single Drive.....\$ 24.95

CABLE - Double Drive.....\$ 34.95

* NOTE - When ordering cables please specify S50 Bus or Other!!!

Call or write for disk controller Board information.



SOUTH EAST MEDIA

P.O. Box 794 Chattanooga TN 37443

1-615-842-4601

Dataman+ DATABASE MANAGEMENT ONE PROGRAM THAT DOES IT ALL!

DATAMAN+ combines the capabilities of DATAMAN, DATARAND and DATACALC. It has been redeveloped from the ground up after over 12 months of experience with the DATAMAN system. DATAMAN+ is a powerful RANDOM Database Management system under FLEX, UNIFLEX and OS-9.

DATAMAN+ is for BUSINESS systems with 56K user ram. You can use DATAMAN+ for inventory control, work scheduling, mailing lists, sales reports and much more. The powerful report writer lets you create invoices, statements, form letters, and any other type of report your business needs. You can perform calculations with your data and print out the results. Special printer handling allows use of any size column output, not just 80 and 132.

DATAMAN+ is password protected at the menu level so that redundant password prompts are eliminated. We've added the human touch with the use of the operators name and calculator style input. DATAMAN+ checks for valid data types on input thus eliminating erroneous data in your database.

DATAMAN+ is report writer has added intelligence so that separate select programs need not be run to create different reports from the same database. As a matter of fact, the report writer is so flexible that you can use it to create invoices, statements, even form letters using data from the database. You can even perform calculations with the data and put the results in the report.

Setting up your system to run DATAMAN+ is very easy and automatic. The entire system has been designed with the experienced user in mind. The operation of the system is so easy that although a manual is provided none is required to run DATAMAN+.

It's easy to create databases and reports with DATAMAN+. Full editing capability has been added to make it a snap. DATAMAN+ is the first truly RANDOM DBM system to allow any size record and any number of fields.

Modifying DATAMAN+ is easy because DATAMAN+ comes with every line of source on disk! and an easy to use manual with sections on each program for the programmer who wants to make modifications or customize it.



ONE PROGRAM THAT DOES IT ALL!

An upgrade will be available for users with DATAMAN, FL X version available now. \$199.95 UNIFLEX and OS-9 versions soon thereafter.

THE BILL PAYER SYSTEM™

THE BILL PAYER is a package of 10 menu driven programs in TSC Extended Basic. This powerful system helps you keep track of your bills. You can create a vendor list, enter invoices to be paid, generate reports about them, print your checks and much more. Uses random access files.

Explore Package now included at the same price. THE PURCHASE ORDER system adds purchase orders to the BILL PAYER. This package of programs adds another level of control to your expenditures. Prints out purchase orders and keeps track of purchases. Requires the Bill Payer to work.

INCOME/EXPENSE LEDGER. This valuable package is most appreciated at tax time. Allows up to 99 income and expense numbers. Ties into the PURCHASE ORDER system, and the Bill Payer.

Includes manual and source supplied on disk in TSC Extended Basic.

THE BILL PAYER \$89.95 BUY ALL THREE AT ONCE
PURCHASE ORDER \$49.95 FOR \$189.95
INC/EXP LEDGER \$49.95 AND SAVE \$19.90

SOME COMMON BASIC PROGRAMS in TSC XBASIC

76 XBASIC programs at less than \$1 each. Stand alone or used as subroutines in your applications. These 76 programs are converted from the OSBORNE/McGraw-Hill book to TSC XBASIC. They support your printer, are fully tested and debugged. Use the AppleII or Wang version of the book (not included) for documentation. The programs are very well commented with a large number of REMarks for easy use. The source is included on the disk. Supplied on TWO 5 inch or ONE 8 inch disk.
76 programs for only \$69.95

READTAPE

READ TRS-80 LEVEL II BASIC TAPES

This program, with an easy to make interface, will read TRS-80 LEVEL II BASIC tapes and convert the programs to TSC BASIC. Those things that can't be converted are flagged so that you can find them easily with the TSC text editor. Now you can use all that TRS-80 software out there. 6809 assembly language - includes sources on disk! \$54.95
(instructions and schematic included - cost about \$2 to build)

PLOT

Now you can have GRAPHICS added to all your programs. Just write the data out to a virtual array and call PLOT. PLOT is written in TSC XBASIC and the source is included on the disk.

INFINITE RESOLUTION GRAPHICS ON YOUR TERMINAL OR PRINTER. HISTOGRAMS, BARGRAPHS, XY PLOTS PLUS OTHERS.

IN TSC XBASIC SOURCE INCLUDED ON DISK. \$44.95

6502 TRANSLATOR

Translator 6502 code to 6809
\$75.00

INVENTORY
with MATERIAL
REQUISITION PLANNING
\$100.00

SUPER SLEUTH
Disassembler for 6800/6809 or Z80
\$99.00

TABULA RASA
Electronic Spreadsheet
\$100.00

SOFTWARE CATALOG

PROGRAM	OBJECT / WITH ONLY / SOURCE code	
DATAMAN+		199.95 x
BILLPAYER		89.95 x
Purchase Order		49.95 x
Income/Expense		49.95 x
All Three		169.96 x
PLOT		44.95 x
TABU A RASA		100.00 x
Mailing List		99.95 x
Forms Display		49.95 x
Inventory with Material		100.00 x
Requisition Planning		69.95 x
Some Common BASIC Programs		
X-FORTH (FLEX)		149.95 8 & 9
CC-FORTH (TRS-80 Color)		99.95 9
TOOLKIT #1 (BASIC)		49.95/ 69.95 9
TOOLKIT #2		49.95/ 69.95 9
COLOR TOOLKIT (TRS-80 Color)		49.95 9
Extended Utilities		49.95/ 69.95 9
Password Protection		69.95/ 89.95 9
CRASMB (X Assembler)		139.95 9
Personality Modules (1 INC)		25.00 50.00 9 ea
6502, 6800, 6805, 6809, Z80, 8080, 1802		
READTAPE		54.95 9
SPELLTEST		199.00/ 299.00 9
READTEST		54.95/ 74.95 8 & 9
ESTHER		39.95/ 59.95 8 & 9
HELP		29.95/ 49.95 8 & 9
Job Control Program		49.95/ 89.95 8 & 9
DYNASOFT PASCAL (FLEX)		59.95/ 89.95 9
DYNASOFT PASCAL (OS-9)		69.95/ 99.95 9
DYNASOFT Compiler Source		125.00 9
DYNASTAR Screen Editor (OS-9)		89.95 9
SUPER SLEUTH (6800/6809)		99.00 8 & 9
SUPER SLEUTH (Z80)		99.00 8 & 9
CROSS Assembler Macros for TSC ASMB		
6800/1, 6803, 6502, Z80, 8080/5		49.95 each
6502 Translator		99.95 9
Debugging Simulators 6805 or 6502		75.00 9 ea
STYLOGRAPH 2.0		295.00 9
STYLOGRAPH 3.0		195.00 9
STYLOGRAPH MAIL MERGE		125.00 9
STYLOGRAPH Spelling Checker		145.00 9
CODE X = XBASIC, 9 = 6809, 8 = 6800, P = PASCAL		
USA add \$2.50 for standard UPS shipping & handling		
Foreign orders add 20% Airmail		
Specify 5" or 8" disk and 6800 or 6809		
VISA — MASTER CHARGE — DINERS CLUB ACCEPTED		
OUR SOFTWARE IS GIMIX COMPATIBLE		

FRANK HOGG LABORATORY, INC.

130 MIDTOWN PLAZA • SYRACUSE NEW YORK 13210 • (315)474-7856

OS-9 DynaStar

DynaStar Full Screen Editor for OS-9 Systems

Full Screen Editor with a Rich selection of Six to
Keystroke commands!
MOVE CURSOR Left, Left word, Right, Right word, Right
Tab, Up, Down
SCROLL Up, Down, Up Screen, Down Screen
DELETE Character, Word, Line, Block
PLUS Find string, Substitute string, Move block, Word
wrap, Right Justify, Center, Also read and write side files.
Execute Shell commands, Optional help menu.

User configurable to virtually any terminal with at least a
64 character line and 9600 baud capability.
Available soon for FLEX 9.

PRICE \$89.95

Dynasoft PASCAL 1.4 for OS-9

Dynasoft Pascal 1.4 includes all the features of the FLEX
version 1.3 with the following enhancements: Chain,
Freed, Fwrite, Seek, Open, Create, Close, Delete, Fork,
Send, Wait, Sleep, Settime, Time, Getstatus, Setstatus,
SelfPriority, GetProcID, and ISR. This is an excellent and
fast program, small enough to write utilities but powerful
enough for things like DynaStar.
Object only \$69.95
Add for run-time source on disk \$30.00
Add for source of Dynasoft Pascal itself \$125.00

FORTH

FLEX COMPATIBLE FORTH

BY Chuck Estlin, Ph.D.
X-FORTH NOTES

If you are considering buying FORTH, You are probably
trying to decide which of the two available for 68XX to
choose. Here are some of the major differences between
the two. Unlike the other FORTH, X-FORTH runs in the
FLEX (or OS-9) environment and uses the same files as any
other FLEX program, which makes it compatible with
other programs or utilities you may have.
X-FORTH at \$149.95 is more or less the same package
as the other FORTH costing \$250.00. X-FORTH is about
25% faster, although exact timing tests have not been run
yet. It is faster because many of the important things are
coded in assembler, not high level FORTH.

X-FORTH documentation is undoubtedly the best
available for any FORTH on any computer. The manual is
divided into four major sections: (1) Tutorial on FORTH in
general; (2) Extensions added for flex; (3) Users manual;
(4) Glossary which lists alphabetically all the words
described in the users manual with complete description.

Supplied on one 8" disk or 2 5" disks, with a 400+ page
manual.

Disk(s) have the source of everything but the core.

PRICE only \$149.95 plus \$2.50 S&H

Manual available separately for \$49.95 plus \$2.50 S&H

THE FUTURE

X-FORTH will be our major applications language in the
future. Life is too short for BASIC. We are planning a com-
plete business package in X-FORTH: A/R, C/L, A/P etc.
Because X-FORTH will run on many different operating
systems, applications written in it will be much easier to
maintain and the market is much bigger.

COMING SOON

OSBORNE GENERAL LEDGER in X-FORTH for FLEX and
OS-9.

META-X-FORTH Cross Compiler for any CPU.
CC-FORTH TRS-80 Color Computer FORTH.

TRS-80 COLOR COMPUTER SOFTWARE

FORTH FOR THE TRS-80 COLOR COMPUTER DISK SYSTEM

Trying to get control of your Color Computer ??? Tired of
translating HEX to decimal??? Tired of remembering where
the VDG and SAM are and how to program them??? Want to
write machine language code with assembly language
mnemonics instead of POKES??
Want to write programs in half the time??? Want to write
lots of small pieces of code that you can put together in
seconds to do BIG JOBS??? Want a language that is at
least 5 to 10 times faster than BASIC??? Want to learn
everything there is to know about FORTH, with the best
manual on the market, including lots of examples of
FORTH applications, and detailed explanations of how
everything works??

CC FORTH IS THE ANSWER!!
Includes Editor, 6809 Assembler,
String Functions, Disk Data File
Operations and Much Much More!
\$99.95

COLOR TOOLKIT

Utility and Diagnostic Disk Programs by Dick Bartholomew

The COLOR Toolkit is a set of Disk diagnostics and Disk
utilities for the TRS-80 Color Computer Disk System. Dick
Bartholomew, well known for his utility programs for FLEX
systems, has created a package of invaluable tools for the
serious programmer. These include: Reading FLEX disks,
Writing FLEX disks, Repairing Radio Shack disks, Extend-
ed directory, and many, many more.

PRICE ONLY \$49.95 on RS disk.

CRASMB

MULTI CPU CROSS ASSEMBLER FOR 6809 FLEX by Frank Hoffman

CRASMB is a conditional macro assembler with the
capability to use different CPU overlays in order to cross
assemble. These CPU overlays called 'CPU PERSONALITY
MODULES' (CPM's) can be called from a source file,
thereby making it easy to create object code for a variety of
CPU's. It is also possible to create new CPM's yourself for
any 8 or 16 bit CPU. The information needed is included in
the manual. If you decide to do this, it would be advisable
to purchase the source for one of the CPM's and modify it
rather than starting from scratch.
CPM's are currently available for the followings CPU's:
6809, 6800, 6805, 6502, 2801/6800, 1802, and
others coming.

PRICE \$139.95

Includes one 8 bit CPM of your choice (not source)

8 Bit \$ 25.00 Additional CPM's

16 Bit \$100.00 Source \$ 25.00 extra

Inquire about a 6800 version.

Spelltest

From Dale Puckett

FAST 6809 MACHINE CODE

SPELLTEST is the most versatile 68XX spelling checker
available.

MENUS MAKE OPERATION EASY. From the menu you
may: Print a list of suspect words; Print a list of valid
words; Check each suspect word one by one; Read your
text, stopping to check suspect words; Use additional dic-
tionaries for more thorough checking or special applica-
tions; Build an additional dictionary of newly accepted
words; Write correct text file to disk.
While checking you may: Accept the suspect word; Accept
and save in the dictionary; Replace with correct spelling.
Designed to be used by the layman, SPELLTEST is right at
home in the office. Ease of use and speed will recover the
cost in days.

22,000 word dictionary covers the first 25,000 entries in the
American Heritage listing of the most common English words.

500 built in common words (and, or, the, etc.) and 300
specific to our field, filter the text and allows a large file
to be processed even in small computers.

**PRICE \$199.00 object only
\$299.00 with source on disk**

TOOLKIT NO1

The Basic Programmers Toolkit by Dick Bartholomew

The Basic Programmers Toolkit gives the BASIC program-
mer the power and flexibility never before achieved under
FLEX. The features include:

EDIT

Edit any in memory BASIC program while in BASIC!
The editor appends to TSC BASIC or can be called from
disk when you load BASIC into memory. It allows editing
any line of your program! It automatically relocates itself
to the top of memory. Totally invisible when not in use, it
can even be used to enter new lines into your program. Its
commands are: move cursor left or right, delete or insert
characters, change string to string2.

DECOMPILE

Change BAC files to BAS files!
The Decompile takes BAC files and creates a BAS file
that can be modified and then recompiled. This is very
useful for making small changes to programs that you
don't have the BAS type file for. You can send the output
to the printer or disk.

XREF

Cross reference for BASIC programs!
The Cross reference is an invaluable tool for finding
targets for GOTO's, and GOSUB's plus all the various
and where they are used.

**PRICE \$49.95 object only
\$69.95 with source on disk!**

TOOLKIT NO2

The Programmers Toolkit by Dick Bartholomew

The Programmers Toolkit is a package of utilities and pro-
grams that extend the capabilities of FLEX to the utmost.
The programs are:

REPAIR

Repair any sector on a Disk!
Repair gives you the following options: Read, Write,
Find a byte, Display, Empty, Next in chain, Next sequential
sector, change drive number and more.

SEGMAP

Graphic display of the sector fragmentation or scatter-
ing of a disk file or the free chain on the disk. This is done
with a Graphic display on the terminal. See LNKMAT.

LNKMAT

Sort and reformat the free chain into sequential order!
LNKMAT will reformat the disk's free chain into sequen-
tial order. If you do a lot of editing or deleting of files this
will speed access time by reducing seek times. This often
eliminates the need to format a new disk and copy files
from one to the other.

FDIR

Full Directory program!
DIRINFO fills the screen with all the information about
your disk, such as: Name, Date, # of Files, Largest,
Smallest, Free space, Linked filename, Format of the disk
plus more.

MAR

Display the addresses of a File!
Display the lowest address, Highest address, size in
bytes. Transfer address, start of record indicators and
more.

CUSTOMIO

Custom I/O allows terminal and printer
standardization!!

The Custom I/O program acts as a translator between
your programs and the printer and terminal. With it you
can use common control codes at the program level and
configure the I/O program to handle the printer and ter-
minal. Whenever a I/O device is changed only the I/O
package need be changed and not all your programs. Now
one version of your program will work with all devices!

PRICE \$49.95 object only

\$69.95 with source on disk!

FRANK HOGG LABORATORY, INC.

130 MIDTOWN PLAZA • SYRACUSE NEW YORK 13210 • (315)474-7856

Flex User Notes

BY: RONALD W. ANDERSON
3540 STRUBRIDGE COURT
ANN ARBOR, MI 48105

MORE ON 6809 ASSEMBLER TECHNIQUES

Last column I included some information on using the 6809 instruction set more effectively when programming in assembler. I asked for some reader feedback at that time, but of course you realize that I have about three of these columns written by the time the first is published, so it will be a couple more months after writing this column before the last is published and I see your comments. Just after I wrote that last column, I added a PROM programmer to my system, and decided to test it out by burning a utility that I use frequently into the prom and plugging it into my MP-09 board. I decided to make the utility position independent so I could plug the prom in anywhere in the address space.

Initial results were instant failure. I had of course forgotten that the customary place for variables in FLEX utilities is at the beginning of the program. That was done to keep them as well as the program in the FLEX utility space and out of the way of any program in user memory. Naturally the variables would have to be moved to RAM, but where would be a good place to put them and still not interfere with the user program space. Putting the user stack at the location found in FLEX MEMEND wouldn't be a bad idea, but I think I had a better one. Why not put the variables on the System Stack? In the case of this test routine, a memory dump favorite of mine, there were only two bytes. After a few initial failures, and a consultation with a friend, we decided that the best procedure would be to push a couple of bytes on the system stack at the start of the program, and then point the User Stack Pointer at them. Now any subroutines used by the program would result in return addresses being pushed on the stack after the variables. The User Stack Pointer would remain pointing at the variable regardless of the subroutine level, so all would work properly. It does, and the program listing is given here as modified for ROM operation.

The use of the User Stack pointer for the variables allows indexed addressing for access, which reduces the byte count to the same as if direct page addressing had been used, as I pointed out in last month's column. This was position independent code to begin with, and the use of the stack for variables has not changed that. In fact, I had one prom and no eraser, but my prom programming program fills all unused bytes with \$FF, so I moved the program up by \$100 bytes and burned it again. This time it ran.

This technique gives us the possibility of utilities in ROM with no chance of interference with a user program. The only caution would be not to have so many variables that the space allotted for the system stack in FLEX would overflow. FLEX allows 128 bytes for the stack, down from \$C07F to \$C000. In fact, this could be overcome by saving the stack pointer at the beginning of the program and moving the stack to a place where enough room is available for all the variables. In this case, it would be easier to leave the system stack alone and put the User stack somewhere else for the variables.

MORE SPELLING CHECKERS

I've just received a copy of Dale Puckett's spelling check program, which is being distributed by Frank Hogg Laboratories. My preliminary look resulted in some communication with Dale, and an improvement in

the operation of the software. Dale has incorporated a "smart dictionary", or rather a number of them. When your text file is read by Spell-Test, it is tested against a list of about 500 very common words, and these are eliminated immediately from the list of words found in your file. Spell-Test gives you a report of how many "common words" you have used, and how many remain at that point unfound. You may then run the program with a number of dictionaries, graded in order from the most used words to the least, and after each you get a report of the number of words still suspect of being misspelled. Since I am interested in finding all the words I can, to make the suspect list smaller, and since I have an 8" disk system, I appended all the dictionaries together, (which Dale suggests as a possibility), and ran a text of about 1500 words through Spell-Test. It had only 39 suspects in just over three minutes to read my file and compare it against a 22,000 word dictionary. I found three obvious typos, and the remaining 36 words were either proper names, or somewhat peculiar to my writing vocabulary. Optimize and optimization were among those.

The user has several options in viewing the suspect words. They may be looked at individually or within the context of the text file, as the file is output to the screen stopping at each suspect. If you correct a word, it is put into the proper place in the text, and output continues until another suspect is found. You, of course have the option to replace the word or let it stand as it is spelled in the original text. Operation is simple and completely prompted, so that you would hardly need to bother reading the manual except to get the information about the various dictionaries and instructions on how to set up the software for your terminal. The output is somewhat "screen oriented", and it is necessary for you to tell Spell-Test what control characters your terminal requires for cursor moves and screen erase. Spell-Test is available with or without Source Listing. See Frank Hogg Laboratory Ad. in this issue.

I have one minor bone to pick with Spell-Test. It formats the text it reads from your file automatically. That is, it was prepared to work with text editors that don't keep carriage returns internally in a paragraph of text (such as Stylograph). My text included the CR's since I had used another editor, and the text was neatly formatted to less than 78 characters per line. The auto formatting would invariably force a new line just before the last word in my original line. That results in alternate long lines and one word lines, which, though no problem in reading the text, just looks a little ragged. The solution is to fool Spell-Test by increasing the constant for the line length when using it for already formatted text, and to decrease that constant when using it with already formatted text. Unfortunately, that means two versions of Spell-Test. Spell-Test is customized for your terminal by assembling and appending a small file containing equates, to the main body of Spell-Test. Perhaps I am the only 6809 user alive who uses more than one editor, and no one else will see this as a problem.

Aside from this slightly ragged appearance of the text with a pre-formatted text file, operation was flawless. The 22,000 word dictionary occupies over 700 sectors, and therefore cannot be appended into one large file if you have a 35 or 40 track single sided 5" disk system. I should mention that Spell-Test allows you to add words to the dictionary or create your own. There is even a special dictionary called "MYWORDS" that can be read each time. You may use it for such things as your name, address, city, company name, and in general any words that might appear frequently in your texts that may be peculiar to you as an individual. You can list the suspect words (or for that matter the good words) to your printer if you desire. This is a good solid piece of software that will be around for a long time.

A friend has bought an EPSON MX-80 printer, and since I need some nice clean text for my book manuscript, I've negotiated to use it for the book. The manual is written in what Art Weller calls the Dick and Jane style. Maybe things have changed, but when I was in First Grade, we had a Reader that went something like "Dick, See Dick run. Jane, See Jane run. Run Jane, run." etc. It is perhaps just what is called for by the average new TRS-80 user. For the user who has had a printer or two and just wants to see what it can do, however, it is not so nice. I finally found the specifications on page 99. I wanted to know what character widths were supported. That item isn't included in the specifications. By looking at the control codes in Appendix I, managed to find two codes that were defined as "sets the enlarged printing" and "sets the condensed printing. Now I knew that there were two widths. That is at least a start. By reading several chapters of the Dick and Jane style, I at last found out that I could print 10 CPI and 16.5 CPI, rather disappointing because I happen to use 12 CPI most of the time with my Paper Tiger. However, the Epson produces such nice crisp output that the 16.5 is very nice looking.

In general, I have the above criticism of manuals written in simplistic style or otherwise. Yes, supplier of hardware or software, do supply a readable manual. Please, though, somewhere that is easy to find, put ALL the data an experienced user will need. While you are at it, make that page easy to find. I see nothing wrong with a specification sheet at the beginning of a manual. If I buy another Pascal Compiler, (I already have used four for the 6809 and one for a Z-80 system), I really don't need to read 100 pages of discussion of what has been implemented and how. Just give me a page indicating what features of Standard Pascal have NOT been implemented, and another page or two that describe any EXTENSIONS that have been included. If you like, call this chapter "For Experienced Pascal Programmers", and put it at the end of the manual if you like. Just let me know that it exists. The first chapter might start out with "This manual describes this implementation of Pascal in detail. For experienced programmers already familiar with Standard (Jensen and Wirth) Pascal, Chapter 23 lists all the deviations from that standard. Chapter 9 deals with the use of this compiler."

Now I don't have to wade through 21 chapters of information I already know, just to find out what has been left out, what has been added, and how to use the compiler. In the case of Epson, the character widths should be included on the specification page, and in the control code descriptions. "Set Normal (10 CPI) width" and "Set Condensed (16.5 CPI)" would do nicely. While I won't name the Pascal with the manual on which the above is based, I will say that the TSC Pascal manual is very well done for an experienced programmer.

The table of contents reads:

1. Introduction
2. How to compile and run Pascal programs
3. Standard features not supported by our Pascal system
4. Non-standard features
5. Adapting to your system
6. Appendix

That just about covers all the important things a Pascal programmer needs. For those who are not familiar with Pascal, TSC includes a Jensen and Wirth Standard. Perhaps TSC has gone to the other extreme of preparing a very useful manual for a Pascal programmer and one that will be very difficult for an inexperienced programmer. I suspect that the

differences in style of the Epson manual and the TSC reflect the market for which their products are aimed. Still, though, I would think a manual could be written that would be useful to both novices and experienced users of similar products.

See page 23 for program

68XX CONVENTION

First 68XX Convention

As I have rumored for the past year or so we are soon to hold our first 68XX convention. The date has been set to coincide with the Atlanta (Georgia) HAM-COMPUTERFEST, which is a two day event, June 12-13 1982.

For the past five years we have exhibited at this show and of all the shows we attend this is the most enjoyable show of them all. For instance there is no hassle getting set up and the show liaison Mr. Chaz Cone and his excellent crew go out of their way to make both exhibitors and visitors feel at home! We have accomplished more missionary type get acquainted with the 68XX and Standard S50 Bus work at this show than about any other we attend, which is about all.

Last year there were 5 Standard S50 Bus exhibitors at the Atlanta show and this year we hope to have many more, all located in one place and demonstrating the full line of 6800-6809 systems (and just maybe a 68000) as well as the RS Color Computer running FLEX with all its power. If you the readers and you the vendors make an effort to attend, we can start what has been needed for a long time; a getting together of users (hobby and business) with the manufacturers and many of those who make and sell all those things we spend our money for.

The agenda has been set up as follows; the regular show dates are June the 12 and 13th 1982 at the Downtown Marriott Hotel in Atlanta. The actual show opens Friday morning (12th) and closes about 2:00 p.m. Sunday (13th), after the show closes, about 4:00 p.m. Sunday afternoon we will have a large (as necessary) hall reserved where we will hold our first convention after a we eat (dutch). It is anticipated that a panel of speakers will be available and also it will give us an opportunity to meet many, eyeball to eyeball, whom we have all read about but never had the chance to meet in person. It is anticipated that you will all get a chance to ask some questions and get answers straight from the sources. This meeting can last as long as necessary and for this the first time most all is very flexible. Remember this is just for you, sellers, buyers and most important 68XX users. If this works out, only you can determine that, then we will do it every year. I will have more on this next month.

For you manufacturer's and vendors please contact me for booth prices and any other information you might need. I have been told by some of you that you plan to exhibit, I need to have an idea soon (within next 15-20 days) so I can get all the booths together, this way will be much better. If you have exhibited at Atlanta before or have already made booth reservations please let me know about this also, I will try to get us all in one area and tied together with streamers or something. But most of all need to know SOON! O.K.?

Also you can contact Chaz Cone directly by telephoning 404 238-4334, which is his office number or his home number is 404 394-9638. Either way is ok by me but I would like to know who is going to exhibit and who is not, many readers have asked me to let them know who will be there. I feel very strong about this sort of get together, we have needed it for too long. I believe that this can go a long way in fostering and helping to cement

that spirit of fellowship that I find among 68XX users. The success of this is up to all of you, I have done all I can by myself.

OMW - - -

COLOR User Notes

ROBERT L. NAY
4429 Plantation Lane
Norcross, GA 30071

Another month is upon us. We have several more interesting subjects to broach, so let's get started.

First, ANOTHER different physical format for the Column. Old Faithful finally let me down; I lost the Power Transformer in the Power Supply and haven't gotten hold of another one yet (no sign of heat damage, etc., and my system has been running cooler than average, so right now I think it was just one of those things). So, this month's edition is being written on a full-blown, 80 x 24 screen, Word Processing System and being printed with a Delay Wheel (actually, to give due credit, on a RS MOD II with Scripsit), so maybe the reproduction will be easy to read.

FLEX 9.0 is now available for the Color Computer - see the discussion and details after I clear up a few points about the MC6883 SAM chip that I discussed last month. We'll get a first look at Radio Shacks' Disk System for the Color Computer - a Double Density 5 1/4" System that is now working pretty good. We take a Quick Look at a POWERFUL Terminal Program from Nelson Software (and Dan has promised The SUPER "COLOR" WRITER in the next week or so - we'll get a Quick Look at it next month, hopefully). Finally, another FANTASTIC Game - Computerware's PAC ATTACK - it's really SUPER. So, onward and upward -

MC6883 CLARIFICATION!!

Most of you, I'm sure, are familiar with the weakest link in any Computer System; the Man/Machine Interface. The most lucid description of this problem is "Garbage IN, Garbage OUT". Between the mess of moving and trying to beat publishing deadlines, I MAY not have been very clear about what the 6883's capabilities are, as installed in the Color Computer, and what is POSSIBLE with some hardware mods, etc. Primarily, I'm referring to the Screen Memory and Display. The discussion of locating Screen Memory in the \$E000 and up area, and have BASIC operating in Page 0 and FLEX in Page 1, wasn't too clear. This would be great, BUT IS NOT POSSIBLE WITHOUT SOME HARDWARE MODS. If you think about it, the SAM only has control of the two 32K Pages; therefore, it can not possibly control the Display Memory at \$E000 because it is not in control of THAT memory. How could you get around this problem??? How about using the SAM in the Type #1 Memory Map (64K RAM) and using the 32K from Exatron for the Page 2 memory. This could be accomplished by borrowing an idea

from the Exatron Unit; use a Flip-Flop (for instance, a 74LS74) to control the Paging by hooking the Q output to one 32K bank of the Memories Enable Line, and the NOT-Q to the other bank. Toggle this Flip-Flop through one of the I/O Ports when switching between BASIC and FLEX. NOW, we have a clean lower RAM for "Standard" FLEX, and Display Memory out of the way above \$E000. Switch the Screen back to \$0400 when calling BASIC, and it will be happy, also, with any Display Screen that might have been used previously still intact.

The idea of having 96K memory OPERATIONAL in the Color Computer is no dream; it's EASY and WORKS. I have run my System that way, with the 64K Mod from Atomtronics discussed last month and the Exatron Expansion unit, which has it's own 32K with it's own memory refresh system, operating in the Type #0 Memory mode. The use of the 96K Memory is NO problem; the Wolfbug Monitor works good, but still has a few "bugs". The Page Controlling works OK; the problem shows up when anything is plugged into the Cartridge Slot. The RESET function does not correctly determine the amount of memory installed in the Computer (it would not locate 96K in any event, because if we are using BASIC's RESET routine, it is going to run into it's own ROM at either \$8000 or \$A000), but, with something in the Cart. Slot, Wolfbug comes up with \$0FFF as the "top of memory" (4K) with some of BASIC's pointers in "Never-never Land". This severely restricts your capabilities with the Computer, to say the least. The "bug is being chased", as the saying goes, and should be solved shortly.

I have been running my Color Computer in the Type #1 Mode with BASIC living in RAM quite a bit. This makes the Single Step function in Data Soft's SIGMON operational for working through the BASIC ROM's (reviewed in an earlier column; an Excellent Program). We'll start reporting how various functions work in future columns; I have a lot of data to assimilate before I can present it in a coherent manner. One tidbit I'll throw out that I haven't seen mentioned before: the reason the Tape System on the Color Computer is so reliable is that the information is not transmitted to the Tape as Square Waves (which requires very high frequency response capabilities to record properly), but as sort of a distorted sine wave. This allows the high transfer rates we are used too, while still allowing the use of lower priced Tapes. Don't get me wrong; you need a "Data" quality Tape for reliable operation; just not an expensive one. (This also means that an Interrupt Driven Tape SAVE is not feasible without changing the Hardware.) As I have stated before, the BASIC in the Color Computer is an Excellent version of the language, and makes good use of the 6809's capabilities. Microsoft's experience shows up more and more as we get deeper into this system.

One other point I may have mentioned before, but it won't hurt to repeat. If you have a Radio Shack CTR-80A Cassette Recorder, you can adjust the "PLAY" head on the unit to allow reading a Tape recorded on a Tape Unit other than your own. The "RECORD" heads may not be aligned the same as yours, causing the recording on the Tape to appear to be

slightly "tilted" in relation to your "READ" head. This means that you don't get a good copy, or strong signal, when you try to read a Tape, causing I/O Errors. Turning up the volume works sometimes, but can also cause distortion, and more Errors. The solution is to adjust the "READ" head to eliminate the distortion. This is accomplished by inserting a SMALL screwdriver through the tiny hole located on the top of the Cassette Recorder above the PLAY button, near the Cassette Lid. This hole is about 5/64th inch in diameter. I normally input AUDIO ON: MOTOR ON <ENTER> and adjust for the most volume. Then you can rewind the Tape, and get a good program LOAD. Just remember, you will have to readjust the head to play your own tapes.

FLEX 9.0 IS NOW AVAILABLE for the Color Computer

As you are probably aware, if you have been following this column, I have been running Steve Odneals' FLEX Conversion on the Color Computer for the last three months. Steve has signed an agreement with

Computer Publishing Inc.
5900 Cassandra Smith
PO Box 849
Hixson, Tn. 37343
615 842-4600

CPI will be handling all sales and advertising for this FLEX 9.0 Conversion, and has the whole system available either separately or as a complete package. Pricing is as follows:

1. TSC's General FLEX 9.0 Package \$150.00
2. Exatron Expansion Unit with Disk Controller \$299.95
3. F-Mate (Conversion Package for the Color Computer) (when purchased with the FLEX System) \$49.95
- (when purchased with out the FLEX System) \$59.95
4. "Screen Clean" kit - noise reducer for the Exatron or Radio Shack Disk Systems \$19.95
5. Single-Sided 40 Track Disk System with Case and Power Supply \$329.95
6. Radio Shack Color Computer - 16K with Extended BASIC \$595.00
7. Other items available - see advertisement

Let's look at this package for a minute. The General FLEX 9.0 Package (since the Color Computer uses the 6809 Computer Chip, ALL references to FLEX refer to the 6809 Version, FLEX 9.0) includes an excellent set of Manuals, the Core of FLEX (the actual Operating System), and various Utilities to allow setting the System up on various Computers. It ALSO includes the EDITOR and a full MACRO ASSEMBLER, so you actually get three full Programs at \$50.00 a Program, which is an EXCELLENT price for programs of

this caliber. "F-Mate" includes a 5 1/4", Single Density disk, with the conversion programs which can be read initially with the Exatron Disk Controller and the Exatron DOS and a set of conversion instructions. The Disk Includes the Input/Output Routine Programs (Disk, Keyboard, and Printer) written for the Color Computer, and a Boot Program which allows the finalized FLEX/SYS to Boot Up with the Exatron Controller, and then bring the rest of FLEX on board. A special NEWDISK Program and PATCHES to several of the normal FLEX Utilities, such as ASN, SAVE.LOW, APPEND.COM, ASMB.COM (the Assembler), EDIT.COM (the Editor), and COPY.COM are also included. PATCHES for other Utilities and Programs are being developed as time permits; I understand that XBASIC is about ready, which will REALLY expand the programs available to the Color Computer User. (A note about FORMATTING problems: if you hit a troublesome disk, try using a Bulk Tape Eraser to really CLEAN a Disk that gives FORMATTING ERRORS; often you can salvage one that you thought was physically damaged and unusable with this technique. Use it just like you were erasing a Tape.)

RADIO SHACK DISK SYSTEM

I have been promising you a look at the Radio Shack Disk System as soon as possible; here it is. My first impression is: GOOD. The System works fine (now that the support chip problem has been solved); the DISK BASIC is straight-forward and fairly complete with a few real "goodies" thrown in; and the Manual that comes with the system is STUNNING, to say the least, after the disappointments of the BASIC and EXTENDED BASIC Manuals. This Manual gives you some REAL information. Now that this System is becoming available, you will start seeing a lot of GOOD Software showing up on the market for the Color Computer. I know of several programs that have been held up waiting for the RS DOS, so that they could be made compatible. And, the Programmers have a system that is going to be easy to work with, both in BASIC and Machine Language.

DISK BASIC Commands include:

DSKINI for formatting a blank Disk
BACKUP for duplicating the contents of one Disk to another (which must have been formatted first)
COPY a file
KILL a file
RENAME it
LOAD a BASIC Program (adding a ,R after the "filename" also RUNs it)
LOADM for a Mach. Lang. Program
SAVE a BASIC Program, (add ,A to SAVE it in ASCII)
SAVEM for Mach. Lang. or Binary files
VERIFY ON or VERIFY OFF
DIR displays the Directory
FREE returns the number of free granules (discussed later) on the disk
DRIVE d (where d is the Drive Number) changes the default drive number to the one you specify
RUN filename "Loads and Goes", while adding a ,R causes all open files to remain open (interesting and highly useful!)
UNLOAD a drive number -- huh?? This closes all open files on any one drive

to allow safe, easy disk changes - nice!!
 MERGE loads an ASCII file from disk and merges it with the existing program in memory; adding the .R causes the program to RUN when merged
 FILES tells the Computer how many buffers to reserve, and how big to make them.

DISK BASIC Functions include the normal Buffer controls with:

OPEN "mode", buffer #, filename, record length which opens a buffer for Sequential Input or Output or opens a Direct (Random) access file for either. Up to 15 Buffers can be used simultaneously. You can
 CLOSE any buffer,
 WRITE or ---
 PRINT data to it (and also use the PRINT #buffer, USING format; data list PRINT instruction), and
 PUT or
 GET a record number. You can
 FIELD a direct access buffer,
 LSET or
 RSET the data into it,
 INPUT or
 LINE INPUT data from the buffer as a variable, get the current record number of any buffer with
 LOC(buffer), or obtain the highest numbered record of a specific buffer with
 LOF(buffer). Finally, you can convert a number to a string with
 MON\$ and vice versa with
 CWN.
 EOF returns a 0 if there is more data in the buffer, or a -1 if it is empty.

I've been saving the best for last. Here are a couple I haven't run into yet, and they really look interesting. They are called

DSKI\$ and
 DSKO\$ and provide DIRECT access to ANY sector on the disk.

Their format looks like this;

DSKI\$ drive #, track, sector, string ver.1, string ver.2
 --- i.e. ---

DSKI\$ 0, 12, 3, M\$, N\$

which gets the 256 bytes of track 12, sector 3, of drive 0, putting the first 128 bytes in M\$ and the second 128 bytes in N\$.

DSKO\$ works thus:

DSKO\$ drive#, track, sec, string1, string2
 which, in real life, looks like this

DSKO\$ 0, 2, 1, "FIRST DATA", "SECOND DATA".

This deposits FIRST DATA's 128 bytes and SECOND DATA's 128 bytes on track 2, sector 1, of Drive 0.

For the Machine Language buffs, I'll summarize the Technical Information - you can obtain a the Disk System Manual for full details. The RSDOS uses the "granule" concept for file allocation, and uses two granules, of 9 sectors each, per track.

Track 17 contains the Directory, leaving 34 Tracks with 68 granules for data storage. Each granule provides 2,304 bytes of data storage. This is my one small complaint with the system; 2K files will mean a lot of wasted space (conversely, 68 files on a 5 1/4" Disk ought to be enough - you would almost need a sorted DIR display to find a n y t h i n g) . S i n c e the DOS lives completely in ROM, no Disk Space is required for "System" utilization.

The first 32 bytes of each Track are utilized for System Controls, the next 6,084 make up the Sectors, the rest, which is variable, contain \$4E. Each Sector contains 338 bytes, organized as follows: 0-55 = system controls, 56-311 = data, and 312-337 = system controls. The system control bytes are organized like so:

0-7	\$00
8-10	\$F5
11	\$FE
12	Track Number
13	\$00
14	Sector Number
15	\$01
16-17	Cyclic Redundancy Check (CRC)
18-39	\$4E
40-51	\$00
52-54	\$F5
55	\$FB
312-313	CRC
314-337	\$4E

Track 17, Sector 2 contains the File Allocation Table; Sectors 3-11 the Directory Entries. Each Directory Entry is 32 bytes long, consisting of:

0-7	Filename - If Byte 0 is 0, the file has been deleted; if FF, this and all following entries have not been used.
8-10	Filename Extension
11	File Type: 0 = BASIC program 1 = BASIC data file 2 = Machine Language program 3 = Text Editor source file
12	ASCII flag: 0 = Binary FF = ASCII
13	The first granule number of the file (0-67)
14-15	The number of bytes in use in the last sector of the file.
16-31	Reserved for future use.

The File Allocation Table uses the first 68 bytes (one for each of the 68 granules), the rest of the sector contains zeroes. Each byte corresponds to its own granule, and contains the following information:

\$FF	This granule is free
\$00-\$43	This number, converted to decimal, points to the next granule in the file.
\$C0-C9	This is the last granule in a file. The value in bits 0-5 indicates how many sectors of this granule are used in the file.

The Disk System Control Routine is called DSKCON. Its entry address is stored at \$C004-C005 and is called as a Subroutine (JSR [\$C004]). DSKCON's parameters are stored in a table pointed to by location \$C006-C007. The Table is organized thusly:

DDOFC	RMB 1 - Operation Code
DDDRV	RMB 1 - Drive Number
DCTRK	RMB 1 - Track Number
DSEC	RMB 1 - Sector Number
DCBPT	RMB 2 - Buffer Pointer
DCSTA	RMB 1 - Status

These parameters are used just like the FLEX FMS. The Status byte is probably the WD1793 status codes, since the Controller uses this chip. Storing a 0 at \$FF40 will turn the Drive Motor off after an access.

Generally, this appears to be a good DOS, that provides the basic capabilities, while also providing some new commands that greatly improves it's power. It is a "lower level" DOS, which I personally applaud, because you are not strapped to a system that does not allow easy expansion. For example, if you could only work with "words" in a programming language, you would lose all the power of "bit" and "byte" manipulations. This DOS allows you to work at the "bit" level, yielding maximum flexibility. After the disappointments of some of the initial games and utilities that came out of Fort Worth, it is heartening to see a well structured program, with features like the DSKCON Routine, in a Program from them (like someone is learning to program this chip out there). Finally, I get the strong impression that whoever wrote the Disk System Manual actually knows what he is doing - the Technical Information is presented in a clear, concise manner so that you don't have to read between the lines to get good, solid information. The rest of the Manual follows their example of "leading" a new user through the use of the system, and again, should provide no problems for those users. All in all, I'm impressed and happy to see some solid information beginning to appear from one of the largest Computer Manufactures in the World.

QUICK LOOK:

Nelson Software Systems
P.O. Box 19096
Minneapolis, Mn. 55419

SUPER "COLOR" TERMINAL

Tape - \$24.95
ROMPAK - \$34.95
Disk - \$44.95

Well, I have the first item from Nelson Software Systems to report on. Many of you will remember that we were expecting to review their SUPER "COLOR" WRITER a few months ago, but still haven't received it. Dan Nelson sent a note with this Program, the SUPER "COLOR" TERMINAL, stating that the Word Processor would be out shortly; so those of you that have ordered it, hang in there a little longer. I think it will be worth the wait. In fairness to Dan, the hold-up hasn't been all his fault. Any serious Software written specifically for the Color Computer must be compatible with the Radio Shack Color Computer Disk System, and that has caused him to hold up finalizing SUPER "COLOR" WRITER until he could be certain that it WAS compatible. Now that the Disk System is beginning to become available, he should have that Program out shortly. I know that he had

a couple of the original units that he was having trouble keeping running (Radio Shack now has that problem licked).

The SUPER "COLOR" TERMINAL is a full smart terminal program that allows the user to communicate with almost any host Computer System that has RS-232 capabilities. We received Version 1.0 on Tape. (If you are running a 4K Color Computer, be sure to obtain the ROM version, because the Tape Program does not leave enough memory for an "input buffer" to accept incoming information.) It contains the following basic functions:

- Full UPPER CASE, LOWER CASE, and CONTROL CODE capabilities with ESCAPE and LINE BREAK.

- The capability to set the RS-232 PARAMETERS from the Keyboard to allow communication with almost any protocol.

- Allows Hardcopy Printing of received information directly if a Printer hookup is available.

- Provides for the storage of received information on Tape or Disk (with the Disk System).

- Receive and/or Send BASIC, Mach. Lang., or ASCII files.

- Create files (Tape with the Tape Program or Disk with the Disk Program) that are compatible with the SUPER "COLOR" WRITER Word Processor.

SUPER "COLOR" TERMINAL is a "Menu Driven" Program; i.e., it comes up in a Master Menu, from which you can go to the COMMUNICATIONS mode, CHG PARAMETERS mode, CREATE BUFFER mode, TAPE TO BUFFER mode, BUFFER TO TAPE mode, DISPLAY BUFFER mode, or LPRINT BUFFER mode (if you have the capability to drive a printer OTHER THAN the normal RS-232 I/O connection on the Color Computer, which is being used for the Communications with the other Computer System).

The COMMUNICATIONS mode provides a full set of CONTROL KEYS thru the use of the <CLEAR> key in a "two-key" mode; i.e., push <CLEAR> and then <C> for "CONTROL C". 32 CONTROL KEYS are provided through the use of A-Z and the ARROW Keys and <SHIFT><CLEAR> (<CLEAR>-<SHIFT><CLEAR> provides CONTROL 28). The top line on the Display Screen is normally used as a "status line" in many of the modes, along with the Cursor Color. For example, a Blue Cursor indicates you are sending a CONTROL CODE. An "E" symbol in the top left corner of the screen means that the BUFFER is closed; when the indicator turns orange, the BUFFER is open for Input or output. COMPUSERVE users should send a CONTROL C for Compuserve Information Service.

SUPER "COLOR" TERMINAL appears to provide a Complete Communications Package, and I think you will find it to be a very popular package. It is an Interrupt Driven Program that has many powerful features. Those of you who have been following this Column are aware of my "preaching" the provision of CONTROL CODES for the Color Computer; this one provides them. You get your first hint of the Interrupt Driven capabilities when you load the Tape the first time - a very colorful Logo comes on the Display Screen WHILE the Tape is LOADING. The Program's power derives from the use of a

software UART style of communications, and basically only utilizes ASCII Code for all communications. This makes it extremely portable; it has been used for communication with many of the major Computer Systems in operation today (and generally, by the Manufacturers of those systems), with no problems. Set the Baud Rate at 4800 and direct-connect to a Radio Shack MODEL II or III and it purrs like a kitten, for example.

As I said before, I think you will find SUPER "COLOR" TERMINAL to be a POWERFUL Program that will find major usage as the industry grows.

COLOR PAC ATTACK

Computerware
1472 Incinitas Blvd - Box 668
Encinitas, Calif. 92024
(714) 436-3517

Tape - \$24.95
Disk - \$29.95
Requires 16K Memory

Computerware advertises COLOR PAK ATTACK as "an incredibly challenging version of the popular arcade game. Great graphics, sound, and action for hours of FUN!!!". All I can add is "AMEN"!! If you are a Pac Man "freak", DO NOT begin this game if you don't have several hours to spend - for instance, if you want to watch the football game tomorrow, LOCK PAK ATTACK IN THE LARGEST SAFE YOU CAN FIND AND THROW AWAY THE KEY. Take a weeks vacation, AND THEN, AND ONLY THEN, get it out and "load it up". OK, I've warned you - don't blame me for the bent Control Stick and blisters.

You may have guessed that I think this CHALLENGING - and doesn't get "old" after you have played it a while. We are approaching the 10,000 point mark in the "HARD" mode (you chose EASY, HARD, or TUFF starting each game), but, in self defense, we have only had the game a couple days, and therefore have only played it a couple thousand times; I expect to do better once I develop a "feel" for the game and get it broken in. (Oh yes; you had better pick up a few spare Controllers for the Computer first chance you get - they can't be indestructible ---- I don't think??)

What more can I say -- get one
YESTERDAY!!!

COLOR INFO

"Color Merge", by Sid Kahn appears courtesy of the Cincinnati TRS-80 Users Group NL, and is reprinted from the Marin County TRS-80 User Group NL, 11/81.

The following program is a merge program for the color computer. It works by peeking the end of a program pointer and then poking it in the

start of the program pointer and doing a CLOAD. The Color Computer does not lose its place when this is done like the Mod one will. To get the sum total of the programs you must still poke the start pointer into MEM manually. A suggestion that will make things easier would be to poke 25 with a 6, and 26 with a 0, this will load the program @ 0600H and in effect give you 1.3K more mem space. A warning with this program is to make sure there are no line number conflicts and be careful of RESTORE and DATA statements.

```
10 CLS:PRINT"MEMORY AVAILABLE:"MEM
'COLOR MERGE
20 A1=PEEK(25):A2=PEEK(26):A3=A1*256+A2
22 B1=PEEK(27):B2=PEEK(28):B3=B1*256+B2
24 PRINT:PRINT"START OF PROGRAM  ":"A3"
"HEX$(A3)
26 PRINT"END OF PROGRAM  ":"B3"
"HEX$(B3)
28 PRINT:PRINT"TYPE FOLLOWING AFTER
LOADING PRO
GRAMS:"
29 PRINT" POKE 25,"A1":POKE 26,"A2
30 PRINT:PRINT"TYPE 'CLOAD' TO LOAD
PROGRAM AND
TYPE 'END' TO
32 INPUT I$
34 IF I$="CLOAD" THEN 40
36 END
40 IF B2<2 THEN 50
42 POKE 25,B1:POKE 26,B2-2:CLOAD
50 POKE 25,B1-1:POKE 26,B2+254:CLOAD
```

"ROMPACK READING", by Sid Kahn appears courtesy of the CINTUG NL 11/81 and reprinted from the MCTUG NL, 11/81.

To COPY ROM-PACKS to cassette you have to disconnect pin 40 on the cartridge connector. Some have done it with scotch tape and some with a SPST switch. Now all you have to do is type 'POKE &HFF23,36' to gain control of the ROM-PAK. To go back to NORMAL (READ the ROM-PAK) type 'POKE &HFF23,37'. This will save the cost of a "ROM BACK-UP Adapter or similar devices from Exatron (in a year's time BIGBYTE and others like it must have saved me HUNDREDS of dollars). However, be warned that if you insert and remove the ROM-PAK with the POWER ON, you RUN the RISK of BLOWING out the ROM inside. I have destroyed my VIDEOTEX pack in just this manner. It would be best to do it with the POWER OFF. The Radio Shack PAKS have the 5 volt lead cut shorter than the TRACES on the edge connector, other PACKS may or may not have this precaution.

Russell Gore...


```

5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156

```

I DUMPON, POSITION INDEPENDENT DUMP PROGRAM MODIFIED
 I FOR USE IN ROM. A JUMP TO START ADDRESS WILL RESULT
 I IN THE PROMPT, 'COMMAND'. ENTER R(FOR NEXT) AND PAGE
 I NUMBER. FOR EXAMPLE M01 WILL DUMP 0100-01FF
 I AFTER A PAGE IS DUMPED, ENTER F TO CONTINUE
 I FORWARD, B TO BACK UP A PAGE, N11 TO GO TO PAGE 11
 I OR E TO EXIT TO DOS.

I YOU CAN USE THE STANDARD FLEX PRINT COMMAND WITH
 I THIS UTILITY. SUPPOSE IT IS IN ROM AT 0000.
 I P,JUMP 0000 WILL ENABLE THE PRINTER AND GO TO THE
 I DUMP PROGRAM. PROMPTS WILL BE ROUTED TO THE TERMINAL
 I AND OUTPUT WILL BE TO THE PRINTER. THE PROGRAM RETURNS
 I TO FLEX ON EXIT, AND THE I/O SWITCHING WILL BE RESTORED.

I BASED ON A VERY EARLY SMTFC UTILITY.
 I TAPE VERSION FOR 6800.

I SYSTEM EQUATES

```

CB15 GETCHR EQU 0CB15
CB18 PUTCHR EQU 0CB18
CB1E PSTRNG EQU 0CB1E
CC22 SWITCH EQU 0CC22
CB03 WARMS EQU 0CB03
CD3C OUTHEX EQU 0CD3C
CB24 PCRLF EQU 0CB24

0000 ADDRHI EQU 0 OFFSEIS FROM U FOR VARIABLES
0001 ADDRLO EQU 1

0000 ORG 0

```

I CODE IS POSITION INDEPENDENT. ORS MAY BE WHATEVER IS REQUIRED BY
 I YOUR FROM PROGRAMMING SOFTWARE.

```

42 0000 34 04 BEGIN PSWS 0 WORKSPACE FOR VARIABLE
43 0002 33 E4 LEAH 0,S USER POINTER AS INDEX
44 0004 C6 FF STARTO LDB 0,FF
45 0006 F7 CC22 STB SWITCH PROMPT TO TERMINAL EVEN IF PRINTER ENABLED
46 0009 30 00 00AS LEAR 0,00AS COMMAND,PCN
47 000B 00 C01E JSR PSTRNG PRINT MESSAGE
48 0010 100E 0010 START LDY 016 FOR LINE COUNT
49 0014 00 60 BSR LFCR
50 0016 00 CD15 INCH JSR GETCHR GET COMMAND
51 0019 01 46 CMPA 0,F FORWARD TO NEXT MEMORY BLOCK
52 001B 27 18 BEQ NEWFRM
53 001D 01 45 CMPA 0,E EXIT TO DOS
54 001F 27 0C BEQ EXIT
55 0021 01 42 CMPA 0,B GO BACK ONE MEMORY BLOCK
56 0023 26 00 BNE SKIP1
57 0025 6A C4 DEC ADDRHI,U USE NOP FOR 8 BYTE PER LINE
58 0027 6A C4 DEC ADDRHI,U
59 0029 20 00 BRA NEWFRM
60 002B 35 06 PULS 0 RESTORE WORKSPACE
61 002D 7E C003 EXIT JMP WARMS

62
63 0030 80 52 SKIP1 BSR BYTE GET NEW START ADDR. HI ORDER
64 0032 37 00 BCS STARTO BAD HEX NUMBER, REPRONT
65 0034 A7 C4 STA ADDRHI,U SAVE IT
66 0036 6F 41 CLR ADDRLO,U START AT BEGINNING OF A PAGE
67 0038 7F CC22 NEWFRM CLR SWITCH
68 003B 80 44 BSR LFCR
69 003D 30 E4 OUTADR LEAH ADDRHI,U
70 003F 00 31 BSR OUT4MS PRINT ADDRESS OF 1ST BYTE ON LINE
71 0041 C6 10 LDB 016 BYTE COUNT FOR A LINE
72 0043 AE C4 OUTHEX LDX ADDRHI,U GET PAGE START
73 0045 34 10 PSWS 1 SAVE FOR ASCII PRINT
74 0047 00 2E LOOP1 OUT2MS OUTPUT ONE BYTE
75 0049 5A 7C MEN1 DECB COUNT BYTES THIS LINE
76 004B 26 78 BNE LOOP1 MORE BYTES THIS LINE

77
78 004E AF C4 H11 STI ADDRHI,U SAVE 1 FOR NEXT LINE
79 004F C6 10 OUTASC LDB 016
80 0050 35 10 PULS 1
81 0052 A6 00 OUTAS1 LBA 1,0 GET BYTE
82 0054 04 7F ANDA 01F MASK OFF HIGH ORD. BIT
83 0056 01 20 CMPA 0120 IS IT PRINTABLE?
84 0058 2C 02 BBE 0017
85 005A 06 7C LBA 012E NOT PRINTABLE, PRINT PERIOD
86 005C 00 CD1B DOIT JSR PUTCHR
87 005F 5A DECB COUNT BYTE
88 0060 26 F0 BNE OUTAS1 GET ANOTHER BYTE

89
90 0062 31 3F H111 LEAH -1,Y DECREMENT LINE COUNT
91 0064 100E 0000 CMPT 0,0 NO1 END OF A PAGE
92 0066 26 04 BNE ENDSTR YES, GET SET TO PRINT ANOTHER PAGE
93 0068 00 15 BSR LFCR
94 006E 20 06 BRA STARTO

95
96 006E 00 11 ENDSTR BSR LFCR END OF A LINE
97 0070 20 C0 BRA OUTADR START ANOTHER LINE

```

```

98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156

```

I SUBROUTINES FOLLOW I
 I OUTPUT FOUR HEX DIGITS AND A SPACE

```

0072 00 CD3C OUT4MS JSR OUTHEX
0075 30 01 LEAR 1,1

```

I OUTPUT TWO HEX DIGITS AND A SPACE

```

0077 00 CD3C OUT2MS JSR OUTHEX
007A 30 01 LEAR 1,1

```

I OUTPUT A SPACE

```

007C 06 20 OUTS LBA 0120
007E 7E CD1B JMP PUTCHR "HIDDEN B15"

```

I USE FLEX PCRLF SO PAUSE IS MONITORED

```

0081 7E CD24 LFCR JMP PCRLF

```

I GET ONE BYTE FROM TERMINAL, INPUT AS TWO HEX DIGITS

```

0084 00 31 BYTE BSR INHEX GET A HEX DIGIT
0086 25 0E BCS DONTBY1 RETURN ON ERROR
0088 40 ASLA MAKE 11 HIGH ORDER NIBBLE
0089 48 ASLA MAKE 11 HIGH ORDER NIBBLE
008A 18 ASLA MAKE 17 HIGH ORDER NIBBLE
008B 48 ASLA MAKE 11 HIGH ORDER NIBBLE
008C 1F 09 TFR A,B SAVE H1 NIBBLE
008E 00 07 BSR INHEX
0090 25 04 BCS DONTBY1
0092 34 C4 ABE0 ABA ADD LOW NIBBLE
0096 39 DONTBY1 RTS

```

I GET A HEX DIGIT AND TEST FOR VALIDITY
 I MUST BE 0-9 OR A-F

```

0097 00 CD15 INHEX JSR GETCHR
009A 00 30 SUBA 0130 REMOVE ASCII BIAS
009C 2B 11 BMI ERROR NOT A NUMBER
009E 01 09 CMPA 009
00A0 2F 0A BLE DONTBY1 NUMBER FROM 0 TO 9
00A2 01 11 CMPA 0111 SEE IF 0A
00A4 2B 09 BMI ERROR CHARACTER BETWEEN 9 AND ASCII A
00A6 01 16 CMPA 0116 SEE IF 0F
00A8 2E 05 BGT ERROR OUT OF RANGE A TO F
00AA 00 07 SUBA 07 ADJUST TO PROPER HEX VALUE FOR A THROUGH F
00AC 1C FE DONTBY1 CLC
00AE 39 RTS

```

I PROMPT STRING

```

00B2 43 4F 4B 40 COMMAND FBC "/COMMAND?/"
00B6 43 4E 44 3F 00B4 04 FEB 4

```

END BEGIN TRANSFER ADDRESS FOR FLEX

0 ERROR(S) DETECTED

SYMBOL TABLE:

```

ADDRHI 0000 ADDRLO 0001 BEGIN 0000 BYTE 0004 COMMAND 0002
DOIT 005C DONTBY1 0096 DONTBY1 00AC ENDSTR 004E ERROR 006F
EXIT 002D GETCHR 0015 INCH 0016 INHEX 0097 LFCR 0081
LOOP1 0047 MEN1 0049 NEWFRM 003B H11 004C H111 0042
OUT2MS 0077 OUT4MS 0072 OUTADR 003D OUTAS1 0052 OUTASC 004E
OUTHEX 003C OUTHEX 0041 OUTS 007C PCRLF 0024 PSTRNG 001E
PUTCHR 001B SKIP1 0030 START 0010 STARTO 0004 SWITCH 0022
WARMS 0003

```

GIMIX CATALOG

GIMIX CATALOG

This issue has another first, a complete catalog from GIMIX. When contacted by Mr. Richard Don of GIMIX he indicated that of all their advertising outlets, 68 Micro Journal gets the "Job done"! It is because you the readers trust the advertising in 68 Micro Journal, which makes us all feel good.

Over the past four years we have watched GIMIX grow into a major manufacturer of Standard S50 Bus computers; from replacement type boards to state of the art complete heavy duty 68XX computers and disk systems. A close review of the catalog in the front of this issue is a prime example of what close quality control and dedication to customer input can accomplish. From this seat, as publisher of 68 Micro Journal, I am proud of the advances that have occurred over the past 4 or 5 years in the 68XX community. GIMIX has been a factor in this accomplishment; the next five should be even better. Good Luck GIMIX!

P.S. Please note that this is GIMIX's COMPLETE catalog, so you don't have to write for one - HERE IT IS on page 3.

DMW - - -

A NEW C COMPILER

Our C compiler is finally ready to ship! Since we didn't know how long it would take, we waited until we had a deliverable product before we started our ad campaign. The frustration of having a product ready to ship for two months before anyone knows about it is easier to take than having orders that can't be filled (or worse, shipping a product that isn't ready).

One of the things we spent a great deal of time on was the user's guide. Our goal was a guide that was logically arranged, complete but short and easy to use, and correct. My personal pet peeve is an example given in a manual which has never been tested, so I spent the time necessary to actually type in each and every example in the "How to Use" section to verify that the example was correct, and that the explanation matched what the program did.

You will note from the ad elsewhere in this issue that our compiler is low in price. We were not interested in trying to get rich from this one effort. We are all gainfully employed and making good livings elsewhere. Our pricing goal was to generate just enough income to keep the project interesting while we work on versions 2 and 3.

The project is far from over. This is still a 'toy' C, with a lot of garbage left over from the 8080 program it came from. One of the things we added to overcome some of this was a separate optimizer program. In version 2, most of the 8080-style code will be gone, eliminating the need for separate optimization.

One item we plan to keep, and improve on, is the relocating linking loader. Version 1 uses RLOAD to achieve relocation of modules. We decided that a special version of RLOAD which we had planned was not necessary, so that anyone who has a working copy of RLOAD, whether purchased from Word's Worth, the '68' library, or from some other source may deduct \$5 from the price of the

FLEX9 release of the compiler. In the future, we would like to provide an assembler written in C, along with a true linking loader, also written in C, so that we can remove the problems associated with maintaining different releases of the compiler with different capabilities.

In order to use this compiler, you should have at least 48K of memory. More allows compilation of larger programs (more symbol table space), but RLOAD removes the need for writing large modules in the FLEX9 release. Unfortunately, some of the SSB users don't have the relocating assembler, so an absolute version is supplied for them.

Three steps (plus one optional step) are required for the use of the relocating compiler: 1) Compilation; 1a)

Optional optimization; 2) Assembly; and 3) Loading. This may seem bothersome to the BASIC programmer who is accustomed to interactive write-and-go code, but it is an inherent feature of compiled languages. In return for these time-consuming steps, you get the ability to generate code which is tight, fast, and in small, reusable modules. With good style, C programs also tend to be much more readable and maintainable than BASIC. Obviously, I have an axe to grind here, so I won't push the point any further.

Also included with the compiler is the source to the run-time package, a simple benchmark program called PRIMES, and a C compiler test program called TESTC, which is designed to catch compiler bugs. I hope to see TESTC run against some of the competition's compilers. The other C source routines furnish useful examples of working C code, although they may not be terribly elegant.

Our goal is to produce a compiler which is complete enough to handle the programs available through the public-domain C library. We hope to reach this goal by early next year. The three versions we plan are our guideline. There may actually be more than three versions. We plan to take enough time to be reasonably sure that each version works properly before we release it, even if that means slipping our schedule. We plan to keep our prices as low as is consistent with producing a quality product, and we plan a liberal upgrade policy which will allow a customer to keep current with the latest revision at a reasonable cost.

We also will be working on applications programs written in C, along with the possible establishment of a C library. More on this in a later editorial.

Please address questions, comments, and orders to: Word's Worth, PO Box 28954, Dallas, Texas 75228.

"C" User Notes

Norm Corino
3 Pryor Road
Natick, MA 01760

This month we will look at how data and variables are represented in a C program, the different ways that variables are stored, the scope of variables and a few other topics.

DECLARATIONS

Most of you already have some concept of data typing. After all, even some Basic allows you to "type" a variable with the addition of the "\$" and "%" modifiers. These tell the interpreter or compiler whether or not a variable is a floating point number, a character or string, or an integer. C merely goes one step further by requiring that you list the type of each variable in something called a DECLARATION before you use it. The declaration consists of the type name and a list of variable of that type. Some examples are:

```
char letter, lncchar, outchar;  
int number, size range;  
  
int size, /* shoe size */  
width, /* shoe width */  
eyelets; /* number of eyelets per side */
```

The format of a declaration is rather loose as the examples show. A declaration is legal as long as the type name comes first followed by one or more variable names, separated by commas, and terminated with a semicolon. It is not necessary to list all the variable of the same type in the same list. If the program is made more readable by making a separate declaration for every variable, then do it. Complex data types and certain functions must also be declared, but those will be covered as the need arises.

NAMES

A name in C can be any collection of letters, digits, or the underscore, "_". The only restriction is that the name must start with a letter. The maximum size of the name and the number of characters that are actually significant depends on both the compiler and the assembler. Most compilers will let you make a name as big as you want. They just ignore all characters beyond the last significant one. In the case of DUGGER's C, eight characters are significant to the compiler, but only six are kept if the name is used for a function, or a variable that will be referenced by the assembler. Most compilers distinguish between upper and lower case. The convention in C has been to use upper case for symbolic constants and lower case for everything else.

INTEGERS

The integer is the fundamental C data type. The size of the integer is the "natural" size of the target machine. For 6809 users that means 16 bits. The integer is a signed quantity with a value ranging from +32767 to -32768. The integer data types are declared as:

```
int name1, name2;
```

The integer can be further modified with the adjectives "short", "long" and "unsigned". The long integer is typically twice the width of an integer. An unsigned integer can assume only positive values ranging from 0 to 65535. A short integer is only guaranteed to

be shorter than a long integer. If that statement stymies you, don't feel alone. The short integer is very dependant on the particular compiler that you are using. These "adjectives" may be combined, which leads to some of the following declarations.

```
short int var1, var2;  
long int var1, var2;  
long var1, var2;  
unsigned long var1, var2;
```

Dugger and Intersoft do not presently support short, long or unsigned integers.

CHARACTERS

The character is defined as being one byte or big enough to hold one (in our case ASCII) character. The full eight bits are available so that you can use the char for any eight bit quantity. Character data types are declared as:

```
char name1, name2;
```

Character data types are sometimes expanded or "promoted" into integers, as when they are used in an expression with integers. They are usually passed to functions as integers. The C standard defines that no character in the local character set (again, ASCII for us) will ever be negative, however arbitrary bit patterns could be sign extended or left unsigned. The choice is either up to the implementor or dictated by the machine architecture. Both Dugger and Intersoft clear the upper byte when promoting a char to an int.

FLOATS and DOUBLES

Float is short for floating point, which in C is represented as a 32 bit number for most machines. A double is a 64 bit floating point number. The value of a float or a double can range between (10exp+38) to (10exp-38). According to the C standard, all floats are promoted to doubles before being used in a calculation. Floats and doubles are declared as:

```
float name1;  
double name1;
```

Neither Dugger or Intersoft presently support floats or doubles, although Dugger claims that release two will support them.

ARRAYS

An array in C is the collection of a data type where any given member of the collection can be accessed via an offset from the first member. Arrays are statically declared in C. That means that their size is fixed by the source code and cannot be altered at run time. All arrays in C have zero as their first indice, therefore the declaration for an array of fifty integers would be:

```
int arr[49];
```

A statement like this would create 100 bytes of storage; however the storage would not be initialized automatically. It would contain garbage until initialized by you in some segment of code.

The indice of an array is always scaled by the size of the data contained in the array. This is done by the compiler.

Arrays cannot be passed to a function as a whole like

they can be in Pascal. What gets passed is either the value or the address of a particular member. Passing the array name to a function defaults to the address of the first member of the array. Here are some examples of how an array and its members are accessed:

```
int nmb[15]; /* the array declaration */

func(nmb); /* address of first int */
func(nmb[0]); /* value of first int */
func(&nmb[1]); /* address of the "1"th int */
```

When the array is a formal parameter declaration for a function the size of the array needn't be specified. Assume that we want to write a function to skip over any leading nonprintable characters in a line of text. Further, we want to put this function in a library. A character string, which is really an array, always ends in a NULL so we don't need to know the maximum length. We just go until we find a nonprintable or the NULL. Here's what the function could look like.

```
skip_white(stg)
char stg[];
{
    int i;

    i = 0;
    while (stg[i] <= ' ' && stg[i] != NULL)
        i++;
    return(&stg[i]);
}
```

There are a couple of things to note here. The first is declaration "char stg[]:". This just told the compiler that the function would be working with an array. The second is to realize that the index is merely added to the base pointer which is considered to be the address of element zero. We could have actually passed the function the address to some middle character of a string. The function doesn't know and doesn't care. What you pass it is considered as the base address.

Arrays may be multi-dimensional. The declaration of a two dimensional array of integers might be:

```
int numbers[3][30];
```

Access to an individual element would look something like:

```
number[1][1]
```

This somewhat peculiar format is used because C would consider number to be a one dimensional array where each element is itself an array. The ordering, or significance, of the indices goes from right to left.

When declaring a multi-dimensional array as the formal parameter to a function, the highest order, or leftmost, index may be left empty but the lower order indices MUST be declared with the correct size. This allows the compiler to calculate the offsets correctly when you vary an index other than the rightmost one. For example:

```
function(arg)
    int arg[][10][20];
```

The above declaration is a good example of scaling. The rightmost index is scaled by two to account for the

integer data type. The middle index is scaled by 40 and the leftmost index is scaled by 400.

POINTERS

If you like pointers in Pascal, then you'll love them in C. For the uninitiated, a pointer is really the address of some object; that is it "points" to the object, hence the name. In C they are declared as:

```
type *name;
```

Here are a few examples:

```
int *argint; /* a pointer to an int */
char *argchar; /* a pointer to a char */
float *argfloat; /* a pointer to a float */
```

The leading asterisk implies indirection or pointing. Be aware that data types may vary in size, but a pointer always has the same size, in our case it is 16 bits, the address width of the 6809. Pointers in C can point to anything, including other pointers, arrays, function etc. Let's assume that we want to write a device handler for an ACIA in C. The function could look something like this.

```
ttyini()
{
    char *status, *data;

    status = 0xE004;
    data = 0xE005;

    while (*status & 0x01 == 0) ;
    return(*data);
}
```

Here the status and data registers are declared as pointers to 8 bit objects or chars. The pointers are set to the appropriate addresses. The receiver status bit, here assumed as bit #0, is polled until it becomes one, then the data is returned to the caller. The "0xE004" is the notation for a hexadecimal number. The semicolon following the while conditional was necessary to prevent the compiler from using the next statement as the body of the while. What we have made is a polling loop out of the while conditional itself.

Pointers can be manipulated arithmetically. They may be incremented or decremented. They may have variables, expressions or constants added to and subtracted from them. Pointers cannot be used with multiplication or division type operations. As with arrays, the compiler will scale arithmetic operations on pointers to account for the data type that is being pointed to. Consider an integer pointer "number" used in the following statements:

```
number++;
number = number + 1;
```

The first statement adds two to number. That is fairly intuitive. The second statement scales "1" by two also. This may not have been so obvious.

Pointers may be used in comparison, but with caution. They may be compared against other pointers freely and against NULL. Beyond that consult the manual for your particular compiler. You may get some funny results.

Let's rewrite the function skip_white() using a


```

skip_white(stg)
char *stg;
{
    while (*stg != ' ' && *stg != NULL)
        stg++;
    return(stg);
}

```

Using the pointer results in code that is much more efficient and faster. There is no need to keep an index around. There is also the benefit of not having to calculate the element address for each of the compares. Still, there will be times when an array is the best way to go. At least in C the choice is yours.

CONSTANTS

Like most other languages, C allows you to have literal and symbolic constants. They may be numbers, characters or strings, as shown below:

```

decimal number -- 1234
octal number (leading 0) -- 01234
hex number (leading 0x) -- 0x1234
character literal -- 'a'
string -- "this is a string".

```

Symbolic constant are set up with the "#define" construct:

```

#define symbol constant
or
#define ESC 0x1B /* define Escape */

```

Symbolic definitions are usually done at the front of the program. Note the convention of using upper case for the symbol name. Commonly used definitions are often kept in a file that is brought in by the compiler via the "#include" construct. These file are usually referred to as header files.

Constants, whether literal or symbolic may assigned to variables and used in comparisons. Special mentions should be made of the string literal. What is actually taken is the storage address of the first character. Hence, a declaration and assignment like:

```

char *p;
p = "this is a string";

```

actually sets p to the address of the first character of the string.

In general, a constant can be used any where a variable or expression could be; Including the string where again the address is used. Note however that string cannot be used directly in a conditional unless you really mean to compare the addresses.

STORAGE CLASSES and SCOPE OF VARIABLES

The C language lets you specify how the variable will be stored. The three basic storage classes are automatic, static and register. There is also the extern, or global, which is a special form of static. The scope of a variable is that portion of a program over which the variables exists, which depends on the storage class.

AUTOMATIC variables are those that are declared inside a given function. Space for them is allocated on the stack when the function is entered and removed just

prior to returning from the function. The scope is the length of the function in which it is declared.

```

function1()
{
    int num;

    num = 32;
}

```

```

function2()
{
    int num;

    num = -762;
}

```

Both function1() and function2() have an integer variable called "num". In each case it is unique and exist only while the program is executing the function in which it was declared.

STATIC variables are allocated permanent storage. Their scope, like that of automatic variables, is limited to the function in which they are declared. Statics give you a way of leaving a variable around after the function is left. It will contain the same value when the function is entered again. Let's write a simple function to keep a count of the number of characters and lines that have been sent to the terminal. We will assume that this function is called by the terminal handler.

```

pretty_term(c)
char c;
{
    static int total_chars = 0;
    static int total_lines = 0;
}

pretty_term(c)
char c;
{
    static int total_chars = 0;
    static int total_lines = 0;

    if (c != CR)
    {
        send(c);
        if (++total_chars == 80)
        {
            send(CR);
            total_chars = 0;
            total_lines++;
        }
        else return;
    }

    if (total_lines == 60)
    {
        while (total_lines++ < 66)
            send(CR);
        total_lines = 0;
    }
}

```

REGISTER variables are held in a register of the machine. There are times when it is advantageous to do this, such as when a variable will be used often in the function. A register variable can save code and

Increase execution speed. A good example would be a loop counter or maybe a string pointer. Register variables are declared as:

```
function(stg)
    register char *stg;
    {
        while (*stg != NULL)
            toupper(*stg++);
    }
```

The usage of register variables is limited to the formal parameters and the automatic variables of functions. Hence their scope is the function in which they are declared. If you accidentally name too many register variable in a function, the compiler will change the excess declarations into automatics. Neither Dugger or Intersoft support register variables. The 6809 really doesn't have the spare registers anyway, although it could probably handle one.

EXTERN, or external, variables are the C language globals. They are allocated permanent storage like the static but they must be declared outside of any function. Their scope is defined as being from the point in the source file where they are declared to the end of the file. An extern existing in the source file would be declared as:

```
char buffer(80);
```

On the other hand, if the variable was really declared in an other file but also needed to be used here also, then it would be declared as:

```
extern char buffer[];
```

More technically, the first form is a definition in that it causes storage to be allocated for the variable. The second form declares to the compiler the characteristic of the variable, in this case an array of characters whose size is unknown. This is again an area that is dependent on the particular compiler.

Both Intersoft and Dugger allow externs, but not real statics. Note that Dugger claims to have statics, but really means externs or globals.

INITIALIZERS

One of the nicer features of C is INITIALIZERS. They allow you to give statics and externs an initial value as part of their declaration. Note that automatic and register variables may not be initialized.

Two simple examples of initializers were given in pretty term(). Here two static integers were cleared to zero. The initialization was done only once, upon program entry. The function then changed them in whatever fashion it needed to.

Even arrays can be initialized, if they are static arrays. Let's write a function that translates the first five digit names from Spanish to English. We will do it with a two dimensional array.

```
translate(stg)
    char *stg; /* pointer to the Spanish */
    {
        int i;
        static char number[2][5] =
            {"Uno", "Dos", "Tres", "Cuatro", "Sinco"},
            {"One", "Two", "Three", "Four", "Five"};
```

```
    for (i = 0; i < 5; i++)
        if (match(stg, number[i][i]))
            return(number[2][i]);

    return(0); /* failed -- no match */
}
```

The first thing to note is how the array was initialized. There were two lists each containing five names. This is consistent with how C looks at an array. However, each list of names was enclosed in brackets which were in turn separated with a comma. The second thing to note is that the array is really an array of pointers to the strings.

I don't want to spend too much time on initializers. Dugger and Intersoft do not support them. Besides, if you really need sophisticated initializers, then you should be reading the C manual.

There is one more data type that we haven't covered and that is the "struct" or structure. It is analogous to Pascal's record. It will be covered towards the end of the series.

I was reading the January issue of BYTE where I notice an ad for another Flex, 6809 C compiler. It is offered by the Introl Corp. of Milwaukee, Wisconsin. It is in the \$300 price class and comes with its own assembler, linker and library manager on 8" disk. I called them and had an interesting talk. They claim that the only parts of the language not supported are long, floats, doubles and bit fields.

I would also like to apologize for constantly pointing out what Dugger and Intersoft do not support. It is not meant to disparage their products. It only done because the tutorial should be true to the C standard, not to a particular product. Both Dugger and Intersoft offer a reasonable compiler if you do not need the complete language. And they are both planning upgrades.

Next time we will cover C's set of operators. At that point you should have a good enough understanding of the language to try some programming.

Bit-Mapped Graphics

by Dr. Samuel I. Green
13052 Ferntrails Lane
Creve Coeur, MO 63141
5 January 1982

I am extremely indebted to '68' Micro Journal and Mr. Thomas H. Hunt for his articles on memory-mapped video boards. I have had an F & D video board for several years, and I gave up on trying to get rid of the streaking and flicker. I had it working streak free once by accessing memory on Phase 1 for video display, but it wanted to run at a strange clock frequency and seemed touchy. The first article by Mr. Hunt eliminated white on black streaking. I was thrilled.

I was even more thrilled with his second article which converted the F & D video memory to bit-mapped graphics. I have done the full conversion and it works great. I had been planning to do a similar conversion, and I'm sure Mr. Hunt saved me six month's labor and

frustration. Thank you and thank you again.

There is a fix for the close spacing of characters which resulted from putting a 7 x 9 character in a 8 x 12 cell. IC 36 is a 74163 which divides the dot clock by 8 to get the character clock. I reconfigured the circuit to divide by 10 by unplugging pins 12 and 13 of IC 36 and connecting pin 11 to pin 12 at the socket. This results in a 10 dot wide cell in which the 7 dot wide characters look very good. Two other changes are then required. The crystal must be changed from 12.44 MHz to 13.5 MHz or thereabouts (for 64 characters per line), and the graphics EPROM has to be changed to get equal spacing between graphic elements. Each byte in the graphics EPROM whose second hex character is 'E' is changed to end in '7'. That is each \$0E becomes \$07 and each \$EE becomes \$E7.

I will correct some errors which were found in the articles. Then I will describe a simple change to the driver which makes it more useful and discuss what I've done lately.

In figure 2 of the first article (page 30 of October 81 issue), which describes modifications to the F & D board to minimize access flicker, IC 35 (a 7420) is mislabeled as IC 20. Also pins 1 and 2 of IC 27 (a 7404) are interchanged.

There are some omissions from the circuit shown in figure 1 in the second article (page 26 of December 81 issue). There must be a wire from IC 17 pin 9 to pin 3 of the 74157 which is added piggyback to IC 22. This wire carries address line A12. Also pins 1 and 4 must be connected at the socket of IC 20 where the

74LS138 now replaces the 74LS139. This allows the address decoding to enable the board.

I had to make one additional change to center the blanking gate on the video. By trial and error I added capacitance to IC 35 pin 9 until an extra vertical line at the left hand edge disappeared and the missing line at the right hand edge fully appeared. The value was 3900 pF.

Mr. Hunt's program called GRAPH performs initialization, screen fill, and setting, resetting, and inverting of single pixels and lines. Set, reset, and invert are selected by whether the value of MODE is 0, 1, or greater than 1. I added a few lines of code so that if mode is negative, the value of the pixel is returned without any changes. This is useful in games which will be my main application. Also it is

convenient to be able to start a figure with the LINE routine instead of the PIXEL routine without drawing anything on the way there. The changes include one RMB 1 called STATUS preceding MODE and the addition of five lines of code in the block called * CHANGE PIXEL IN REFRESH MEMORY starting at \$745C.

```

0026      STATUS RMB 1
0027      MODE RMB 1
          x

          x
          x Change pixel in refresh memory
          x

745C DE 00      LDX TEMPS1
745E D6 27      LDA B MODE

7460 2A 0B      BPL SET Positive?
7462 7F 00 26   CLR STATUS Status=0
7465 A4 00      AND A 0,X Pixel value
7467 27 03      BEQ RETURN Zero
7469 7C 00 26   INC STATUS One
746C 39      RETURN RTS

746D 26 05      SET BME CLEAR Original
746F AA 00      ORA A 0,X
7471 A7 00      STA A 0,X
7473 39      RTS
7474 C1 01      CLEAR CMP B 1

```

First I used GRAPH to set some points and draw some lines and execute Mr. Hunt's DEMO program. After a few days of that I patched the TSC Extended Disk Basic to the Graphics Drivers using PEEK, POKE, and USR functions. Using Basic I wrote a game in which two players input muzzle velocity and elevation angle to cannons in their respective forts and alternately fire at each other over randomized terrain usually including a tall mountain. The shells leave a trail in the air and blast craters in the terrain when they hit. Of course all physical laws are obeyed, and the wind always has a large asymmetrical effect.

I tried doing some moving figures by drawing them from a look up table, erasing them, and redrawing them at a slightly different position. As you can guess, it was slow and flickered badly. The basic interpreter wasn't fast enough.

Then I tried using the A/BASIC compiler. It is patched to FLEX2 by using the instructions in Kilobaud Microcomputing. The June '81 68XX article has the instructions and listing, and the December '81 68XX article has the correct addresses for FLEX2.

A/BASIC is strange and difficult to use at first, but the resulting code is super-fast. Now I have to put in delay loops to keep the Klingons on the screen

long enough to start aiming the gun turret.

I reassembled the Graphics Driver routine to get the base page variables out of the way of A/BASIC and used PEEK, POKE, and CALL(user) again. But A/BASIC lets you specify the location of variables in memory, so I reassembled the Graphics Drivers again. This time I used RMB 2 for the variables to be passed, since A/BASIC uses 16 bit variables. Now I can simply set variables and CALL the appropriate Graphics Driver routine.

I put the shape of a figure to be drawn in a look-up table. In TSC Basic the coordinates and status of points and lines can be entered in data statements. In A/BASIC the coordinates and status are entered in two's-complement hex directly into memory where the appropriate variable array was defined. Then to draw an attacking Klingon, the main program passes the center coordinates to a subroutine which erases the old figure and draws the new one scaled to a larger size. There's plenty of time for all this with the compiled Basic.

Thanks again to Mr. Hunt.

SWTPC C

SOUTHWEST TECHNICAL PRODUCTS CORPORATION, a San Antonio, Texas based pioneer in the Micro Computer Industry, has just released its "C" Compiler to the Data processing marketplace. The "C" Compiler is a "full-blown" C developed by James McCosh. With all of the dust rising over the numerous "C" compiler subsets about to hit the scene, SWTPC did it again--living up to its corporate philosophy, of being "OFTEN FIRST--ALWAYS THE BEST."

"C" is the first true serious attempt at standardization. In the past, attempts were made with the various standards imposed on COBOL, yet today full standardization is far from a reality. PASCAL is also making an attempt for standard code. "C", however, is not hardware dependent--any system using Unix*, or a Unix-base will find "C" produces fully transportable code from one machine to another.

With the release of "C", emerges an entirely new nomenclature for Data Processing techniques. Just like SWTPC was the driving force creating the niche for micro-computers, "C" opens the race for a micro-mini. The recently announced S+ System, with a separate optional I/O

preprocessor and service to 32 serial ports is the beginning. Now about the only difference between a mini and our Micro, is the bottom line on the invoice.

The support of DMA and SMD mass storage devices offer latitude and choice seldom found in this industry. Best of all, upgradability is the name of the game. You can start with an S/O9 with 128K of RAM memory, dual 8" diskettes and 1 CRT and expand to 1024K of memory, 2.3 gigabytes of disk storage and 32 terminal devices with I/O preprocessing and VIAbus 408K-baud networking. This is UPGRADEABILITY!

*UNIX is a registered trademark of Bell Laboratories.

680X User Notes

PROGRAMMERS FOR THE 6809

The following request for programmers for 6809 machines turned up in the Northwest Computer Club newsletter, 10/81. For those talented and interested in making some money, I'm reprinting the letter below:

"I am writing to give you a brief description of what I am doing. For the last 8 months I have been writing programs for the TRS-80 Color Computer. Most of these programs are in machine language and they are selling well. I am, however, becoming increasingly bogged down by the business end of this venture. I intend to make Spectral Associates a leading producer of high resolution color graphics software with primary emphasis on the 6809. We currently have the new Hitachi MB6809 Personal Computer and will soon get the Fujitsu Micro-8. Neither have been released on the American market and both use the 6809.

I need capable programmers who want to write good, quality software, on a royalty basis for these machines. I have high level contacts at Tandy, Hitachi and Fujitsu which will prove very useful. I have complete development facilities here in Tacoma for those who wish to avail themselves."

Tom Rosenbaum

Mr. Rosenbaum also said that the Hitachi has Microsoft BASIC and a disassembler. It has 32K with 17K video control and overhead, 14K for programs. Interested people should contact him at: Spectral Associates, 141 Harvard Ave., Tacoma, WA 98466, (206) 565-8483.

NOTES ON THE TRS-80 COLOR COMPUTER

Speaking of the Color computer, I ran across some notes by Dean Alexander of the Rochester NY TRS-80 Club, in their LLIST newsletter, 10/81. The following is Dean's article:

Contrary to the limited information provided in the Reference Summary section of the Extended Color BASIC Manual for CSAVEM function, the proper numeric input to write out a machine language file to cassette is to use decimal numbers (not hexadecimal as shown. This error is also duplicated on the quick reference card. The proper format is: CSAVEM "Name",Start,End,Transfer. Where "Name" = filename; start, end and transfer are decimal numbers representing the start, end and transfer addresses of the machine language program.

There is an excellent program in the April '81 issue of '68" MICRO JOURNAL, page 26, by Ralph Tenny. For the hobbyist who wants to do a little fooling around with machine language programming on the color computer, this program allows the user to examine memory, enter machine code directly in hex, and verify the entry.

SAMPLE MACHINE LANGUAGE EXERCISE:

This program is similar to the one on page 4-1 of the "6809 ASSEMBLER LANGUAGE PROGRAMMING", by Lance Leventhal and will serve as a basis for working out many of the sample programs described in that excellent publication.

The following table represents the full source and object code structure of a sample program which moves the contents of Memory Location 12010 to Memory Location 12011.

MEMORY DECIMAL	ADDRESS IN HEX	OBJECT CODE	OP CODE	OPERAND
12001	2EE1	B6 2E EA	LDA	\$2EEA
12004	2EE4	B7 2E EB	STA	\$2EEB
12007	2EE7	39	RTS	
12008	2EE8	00		
12009	2EE9	00		
12010	2EEA	FF		data
12011	2EEB	00		

(note: 12008 & 9 are memory locations not used, 12010 is the data to move, and 12011 is the store address.)

Add the following program to the above referenced Machine Code Entry Program from '68' MICRO JOURNAL:

```
500 REM MACHINE LANGUAGE CONTROL
510 DEF USR0=12001
520 A=USR(0)
530 X=PEEK(12010)
540 PRINTX:
550 Y=PEEK(12011)
560 PRINTY
570 END
```

Type "RUN" (This gets into the Code Entry Program)
Type "E" then "2EE1"

680X USER NOTES, by Dave Baxter

The following notes are from Dave Baxter's 680X column in the November issue of RAMS NL. Dave talks about the TSC FLEX NEWSLETTER.

The Flex Newsletter No. 5 came out recently. It has the usual mix of TSC product descriptions and user tips. The first section is news of new Flex users among the Japanese computer manufacturers. Adtek of Japan has translated the Flex manual set into Japanese for use on their 6809 system aimed primarily at industry and system development. TSC also anticipates that FLEX will be available for both the Hitachi MB6809 and the Fujitsu Micro-8. Both of these machines sport color graphics as a selling point.

Per the newsletter, here are the current version numbers of their major software packages:

PROGRAM	6809 ver.	6800 ver.
6809 PASCAL	3	
Extended BASIC	19	17
Ext. BASIC Precompiler	4	2
BASIC	15	13
BASIC Precompiler	3	2
Text Editor	2	
Assembler	2	
Text Processor	4	
Sort/Merge	3	3
Debug	17	

If your versions are less than these you may want to take advantage of TSC's liberal update policy. If you have owned the package for over two months, send the original disk and proof of purchase along with ten dollars to TSC and they will send it back updated. Owners under two months, the updates are free. I've done it with my software a couple of times. Be prepared - the BASIC keeps getting bigger each time and your bigger programs may not fit with it.

The tips section of the newsletter talked about an interesting feature that I didn't know about the MON command. When using the MON command, it is all right to put additional parameters following the command. That is, if you wanted to run a command such as LIST, but -anted to put in a few patches before running it, the two step process would be as follows. First get the command in the utility workspace using the GET command (+++ GET

LIST). Second, use the MON command with the additional parameters to get to the monitor to do your patching (+++MON 1.SOURCE.TXT). When finished with the patches, jump to the starting address of the command (\$A100 or \$C100 usually) and it will run picking up the additional parameters as if input with the command.

The final section of the newsletter is the listing of a SI load utility. The program in the newsletter could be used to send binary programs with a modem. It could also be used to exchange programs and text with a non-Flex system, such as EXORCISOR or OS-9.

SWTP COMPATABILITY WITH SWTP

SWTP 6809 computers are now all being shipped as 2 MHz units. SWTP offers an EPROM programmer board, the MP-R. The MP-R, and it's software are meant for operation at 1 MHz only. It will not work in a 2MHz system. A call to SWTP about this brought news that the MP-R will only work at 1MHz, and there are no plans to redesign the board to work at 2MHz. The ROM/RAM boards on these systems will probably have a few empty sockets!

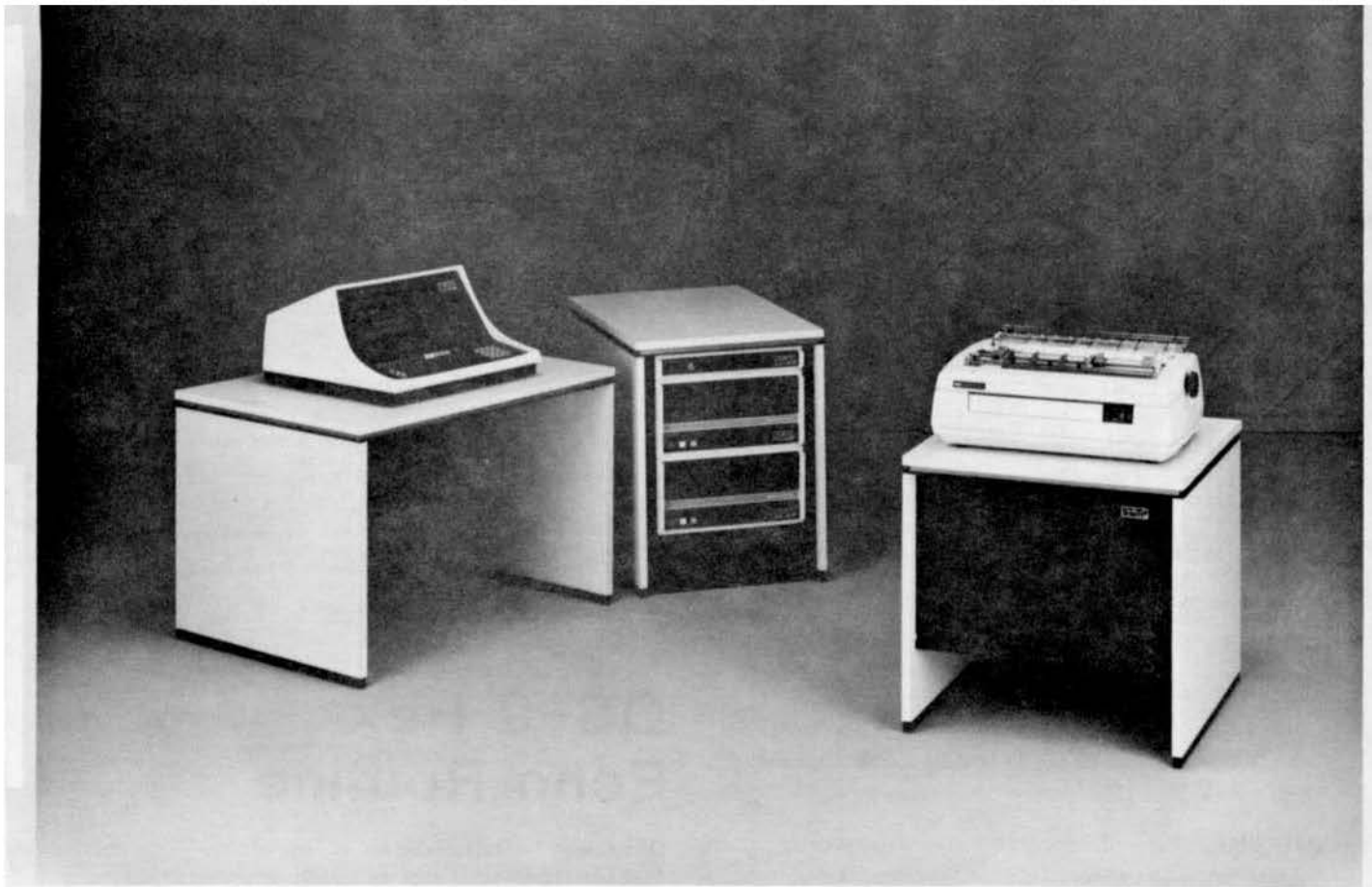
From ACG-NJ Newsletter - Tnks Guys

OS-9 Hex Echo Routine

This summer I finally received my long awaited OS-9 operating system from MICROWARE. After bringing it up on my hybrid SWTPC system I discovered that there was virtually no method (with the system as supplied) to setup and control my console CRT and system printer. Both of these devices require ASCII control characters in the range of hex 00 to hex 1F for initialization and function changes.

The IO manager supplied with OS-9 for support of serial character devices filters out all but a few ASCII control characters. Further, the ECHO routine supplied will only echo characters that were input via the terminal. If you do not have a terminal that can generate all the ASCII control characters then you have no way to output these characters. This is the case with my CRT terminal, a modified TI-914 unit.

To overcome this problem I developed a hex echo routine called HECMO. This routine is written in reentrant 6809 assembly code designed to operate as an executable module in the OS-9 environment. The routine works by taking two ASCII characters from the input path and converting them into one hex byte. Any characters inputted that are not in the range of 0 through 9 or A through F will be converted to hex zeros. Also, spaces will be ignored and characters and converting each into a hex nibble in the event that there is an odd number of input characters the last nibble will be defaulted to



THE COMPLETE BUSINESS SYSTEM

+ Multiuser + Highly Expandable + Cost Effective

S+ THE CONCEPT

The S+ system is a modular computer system in which all portions of the hardware and software are designed to work together in the most efficient way possible. An S+ single user system with floppy disk storage is a competitive and cost effective entry level system. Unlike most other small computers being sold as "personal", or "small business" machines, the S+ system may be expanded to maximum capabilities using this same hardware and software. You cannot end up with a DEAD END system that cannot be expanded and whose software is not compatible with larger machines. A basic S+ system may be expanded to thirty-two users, a megabyte of main memory and hundreds of megabytes of hard disk storage by simply plugging in, or connecting the desired upgrade equipment.

TOTAL DESIGN—Hardware and Software

The S+ system is an integrated hardware and software design. The two complement and enhance each other in this system. The UniFLEX® operating

system used in the S+ systems is patterned after the Bell Laboratories UNIX® operating system, one of the most admired and widely used operating systems in the world. Instead of being an afterthought, the software is part of the design of the S+ system. You can be sure that with this approach that all parts of the computer operate with maximum efficiency and cost effectiveness.

THE CENTRAL PROCESSOR

The basic S+ system is configured with 256K bytes of memory and can be expanded to more than 1 million bytes. An efficient and fast hardware memory management system is used to allocate the available memory among the users on a dynamic basis. As little as 8K bytes, or the entire memory—if needed—can be used by any individual user. This makes it possible to run very large programs on the system, but it also uses no more memory than necessary for a particular job. The increase in cost effectiveness of this system over crude and outdated bank switching arrangements is dramatic.

The central processor runs in both user and supervisor states. It can detect and reject a defective user program. It is impossible for a user program to go bad and stop the entire system, as can happen quite easily in less sophisticated systems.

Task switching is accomplished by use of a multiple map RAM memory, with sixty-four individual task maps. Each task can access from 4 to 64 K-bytes of memory. Multiple tasks may be used in programs that require more than 64K bytes of memory for execution. When a task is completed the memory is automatically released for other use.

SOFTWARE

The S+ operating system, UniFLEX® is a multiuser, multitasking operating system based on the UNIX® operating system that has been used for many years on Digital Equipment Corp. PDP-11 series minicomputers. It is considered one of the most sophisticated and "user friendly" operating systems available. Variations of UNIX® are rapidly becoming standard on mini and larger microcomputers.

A large variety of languages are available for use with the system. These include FORTRAN, COBOL, BASIC, and Pascal. Word processing packages are also available to give you full text processing capability on the system.

Applications programs are available in large quantities in many fields. This includes general business, medical, dental, veterinary, library and real estate management; plus others. Since the system is multiuser it can also be connected to cash registers to produce a point-of-sale terminal system combined with the computer. The possibilities for application of this system are endless.

THE I/O SYSTEM

The S+ system is totally interrupt driven. All terminal and printer I/O devices connect to an I/O bus separate from the main bus. Up to thirty-two separate devices may be connected to the I/O bus at any one time. If I/O activity is great enough to cause an unacceptable slowdown in system operation, a separate I/O processor can be installed in the system. This plug-in option removes all I/O handling

overhead from the main processor and allows operation of up to thirty-two external devices at 9,600 baud. Without an integrated total design, as in the S+ system, it would become impractical to use a UNIX® type operating system in a situation with heavy terminal I/O activity.

DISK STORAGE

A wide range of disk storage capacity is available for the S+ system, from 2.5 M-byte floppy disks to an 80 M-byte Winchester and many sizes between. All disk controllers use direct memory access (DMA) type operations to maximize data transfer and to minimize overhead on the main processor. The Winchester disks also use intelligent controllers along with DMA transfers to preserve the performance that these type devices are capable of giving. Without this distributed intelligence the system performance would be greatly degraded. The UniFLEX® operating system is designed to work at maximum efficiency with this type disk system. The data transfer rates achieved by this combination rival those of large minicomputers.

COMMUNICATIONS

A high speed local network communications system is available to interconnect S+ systems. The VIA-BUS® network will allow communication between systems at data rates of over 400K baud. Such a system makes it possible to share data between local systems in an efficient and low-cost manner.

AVAILABLE SOON

Tape backup—20M-Byte in less than 15 minutes on a standard ¼ inch cartridge.

Mini-Wini—5 and 10 M-Byte Winchesters—5¼ inch package. Winchester performance, for smaller systems in a small package. UniFLEX® compatible design.

Large Capacity—190 and 340 M-Byte Winchesters, plus SMD cartridge drives.

UniFLEX is a registered trademark of Technical Systems Consultants, Inc.

UNIX is a registered trademark of Bell Labs.

VIABUS is a registered trademark of Southwest Technical Products Corporation.



SOUTHWEST TECHNICAL PRODUCTS CORPORATION
219 W. RHAPSODY
SAN ANTONIO, TEXAS 78216

(512) 344-0241

Only two types of errors will result in the program module being aborted. These error types are:
more than 40 bytes of output generated and OS-9
system errors.

```
00001      *****
00002      ***** Here character echo module *****
00003      *****
00004      ***** This routine converts ASCII characters in the range *****
00005      ***** @ through 9 and A through F into their equivalent *****
00006      ***** hex value of 0 through F. Other than the above ASCII *****
00007      ***** characters will be converted to a hex 0. The ASCII *****
00008      ***** characters should be entered in pairs to avoid *****
00009      ***** errors. The input is terminated by a 'NEW LINE' *****
00010      ***** character. Spaces are ignored. All ASCII *****
00011      ***** alphabetic characters must be upper case to be *****
00012      ***** recognized. *****
00013      *****
00014      ***** The input to the module must be in the command *****
00015      ***** line. However, the output may be redirected to *****
00016      ***** any valid OS-9 file or device. *****
00017      *****
00018      ***** A typical COMMAND would be *****
00019      ***** *****
00020      ***** "ECHO" >> ID QS "NEW LINE" *****
00021      ***** *****
00022      ***** This COMMAND would cause the ESC sequence to be *****
00023      ***** sent to the printer. If this printer was a HI-80, *****
00024      ***** then it would be switched to the enhanced print mode. *****
00025      ***** *****
00026      ***** *****
00027      ***** BY *****
00028      ***** *****
00029      ***** JOHN J. STUBBS *****
00030      ***** P.O. BOX 2242 *****
00031      ***** RICHMOND, TEXAS 75080 *****
00032      ***** *****
00033      *****
00034      #
00035      # Set OS-9 header variables
00036      #
00037      0010      PSN      SET      20001B000    Program module identification
00038      0040      OBJ      SET      100000001    L809 object code identification
00039      0080      REENT     SET      210000000    Breakpoint code identification
00040      00C1      REV      SET      1          Revision level
00041      #
00042      # Set OS-9 call codes
00043      #
00044      0000      FNAMEIT   SET      006        OS-9 exit routine
00045      000C      JUMBIT    SET      00C        OS-9 mstop routine
00046      *****
00047      ***** OPT      F,S,B,U100
00048      ***** NAM      MET ECHO ROUTINE
00049      0000      0000 B7CB0000
00050      0004      0004 06001191
00051      0000      0000 0A001701
00052      000C      0000 00
00053      0000      0000 045454H NAME      FCS      "MECHO"
00054      0011      CF              NAME      FCS      "MECHO"
00055      *****
00056      # Data areas (minimum memory allocation is 756 bytes)
00057      #
00058      #
00059      0000      0000      BUFF      RWB      40          Output buffer
00060      0028      CBNW      RWB      01          Character counter
00061      002F      STACK     RWB      215         Stack area
00062      0100      BTOP      EDU      .
00063      # Entry point
00064      #
00065      0012      31C4      MAINB     LEAF      BUFF,U      Get address at data area
00066      0014      4FC820      CLJ      COUNT,U      Clear output buffer counter
00067      0017      A401      CONVIT    TBA      0,1      Get character from input buffer
00068      0019      8120      CMPA      4820      Is it a space
00069      001B      7716      BEQ      SPACE      If yes then go to skip space routine
00070      001D      8100      CMPA      0000      Else is it a NEW LINE character
00071      001F      7716      BEQ      CONT1     If yes then go to transmit routine
00072      0021      0BLS      BSX      0       Else go to conversion routine
00073      0023      6764      STA      0,F      Store hex byte in output buffer
00074      0025      3121      LEAH      1,Y      Increment reg Y by 1
00075      0027      6CC820      INC      COUNT,U      Increment output counter
00076      0029      6AC820      LDB      COUNT,U      Get output count
00077      002B      C120      CMPR      440      Is output count equal to 40
00078      002F      771A      BEQ      ENVI1     If equal go to error routine
00079      0031      20E4      ORA      CONVIT
```

00079	#				
00080	# Save spaces routine				
00081	#				
00082	0033 3001	SPACE	LEAI	1,1	Increment input pointer
00083	0053 2000	BNA	CBNVI		Continue Processing
00084	#				
00085	# Output buffer routine				
00086	#				
00087	0037 300B20	CONII	LEAI	COUNT,U	Get address of output counter
00088	003A E401		LDI	0,1	Load reg B with length of output
00089	003C 4F		CLAI		Clear reg A
00090	003D 1F02		TFR	D,7	Move reg B to reg 7
00091	003F 30C4		LEAI	BUFF,U	Get address of output buffer
00092	0011 0401		LDA	01	Load output path number
00093	0043 103F0C		009	100011	Write buffer to output path
00094	0046 2505		PCS	ERR2	Branch if error
00095	#				
00096	# Normal return				
00097	#				
00098	0048 5F		CLAI		Set error number to 0
00099	0049 2002		BNA	ERR2	Return to 05-9
00100	#				
00101	# Error return				
00102	#				
00103	004B C403	ERR1	LDI	011	Load "EXCESSIVE VERBAGE" error number
00104	004D 103F06	ERR2	059	F0E111	Return to 059
00105	#				
00106	# Get a byte from the input line				
00107	#				
00108	0050 A604	BE10	LDA	0,1	Load reg A with character from input line
00109	0052 0100		CPAI	000	Is it a NEW LINE character
00110	0054 2402		BNE	61MC	If not go to 61MC
00111	0056 4F		CLAI		Else clear reg B
00112	0057 39		RTS		
00113	0058 3001	61MC	LEAI	1,1	Increment reg B by 1
00114	005B 0120		CPAI	0020	Is it a space
00115	005C 27F2		BEQ	BE10	Get next input character
00116	005E 39	BE10	RTS		
00117	#				
00118	# Convert one ASCII byte to one HEX nibble				
00119	#				
00120	005F 00EF	HE1	BSR	BE10	Get one input byte
00121	0061 0030		SUBAI	0130	Subtract ASCII 0 from Character
00122	0064 280F		BMI	HE12	If less than ASCII 0 go clear reg A
00123	0065 0109		CPAI	009	Else is character less than or equal ASCII 9
00124	0067 2F04		BLE	HE11	Then return
00125	0069 0111		CPAI	0011	Else is character less than ASCII A
00126	006B 2B07		BRI	HE12	Then go to clear reg A
00127	006D 0116		CPAI	0016	Else is character higher than ASCII F
00128	006F 2E03		BGT	HE12	Then go clear reg A
00129	0071 0007		SUBAI	07	Else subtract 7 from character
00130	0073 39	HE11	RTS		
00131	0074 4F	HE12	CLAI		Clear character to hex 00
00132	0075 39		RTS		
00133	#				
00134	# Convert two ASCII bytes to one HEX byte				
00135	#				
00136	0076 00E7	#	BSR	HE1	Get right hex nibble
00137	0078 40		ASLA		Shift right
00138	0079 40		ASLA		nibble
00139	007A 40		ASLA		to
00140	007B 40		ASLA		left nibble
00141	007C 1F09		TFR	A,0	Save reg A to reg 0
00142	007E 000F		BSR	HE1	Get left hex nibble
00143	0080 3404		PSHS	0	Add reg 0
00144	0082 40E0		ASRA	1,1	to reg A
00145	0081 30		RTS		
00146	0083 B7C104		ENDD		
00147	0080	HEEND	END	#	
00148	#				
00000	# error(s)				
00000	# warning(s)				
00000	# 00000 program bytes generated				
00100	# 00256 data bytes allocated				
001AB	# 00427 bytes used for symbols				
0076 L B	0000 B BUFF	0037 L CONTI	0017 L COMPT	0020 B COUNT	0040 L EXR1
0040 L ERR2	0000 S FRE111	005E L BE10	0050 L BE10	005B L 61MC	0006 E HEEND
003F L HE1	0073 L HE11	0074 L HE12	000C S 100011	0012 L MAIN	0000 L NAME
0001 S DBJ	0010 S PGM	0000 S REEND	0001 S REV	0033 L SPACE	0029 B STACK
0000 F R10R					

SUPPORT YOUR ADVERTISERS

BIT Bucket

Francis E. Van Horn
418 Estes Street
Murfreesboro, TN
37130

January 11, 1982

To The Editor,

In John Tucker's review of the Epson MX-100 in the Nov. 81 issue the following statement was made: "If you need to build a cable, the plug is the common one used with the Centronics and is widely available." This statement caused my printer cable to cost me about \$6 more than it would have, if I had been given the correct information.

The plug is specifically a 57-30360 (AMPHENOL). This plug is used with the Centronics 702, 703 and 779, but is not used with several other Centronics printers.

Although this article does not specifically say so, it does imply that the printer comes with both parallel and serial interfaces. According to the manual I received and the printer I purchased, the parallel interface is standard. If you need a serial interface, it is optional and you would do well to make sure you order a printer with a serial interface.

With these exceptions I would agree with most of what Mr. Tucker had to say. It is an outstanding printer. And, the ability to set print size, density, and form length all under software control is a great asset.

HELIX ENTERPRISES
503 FORT DRUM DRIVE • AUSTIN, TEXAS 78745

January 11, 1982

Dear Mr. Williams,

Your help is solicited by our firm to locate customers of ours who purchased IBMPAK in May, 1981. The initial sales and distribution were handled by a separate firm who agreed to provide us with names and addresses of purchasers so we could provide updates for IBMPAK. This information was not made available to us, therefore we have no way of contacting these early customers.

If purchasers of IBMPAK serial numbers 1225-1235 will contact us, we will be pleased to provide them with updated software.

As we are now handling our own distribution and keeping records of our purchasers, this is no longer a problem. Thank you for your help in assisting us to locate these customers.

James G. Georgoulis

CLELL A. DILDY, JR.
2401 W 27TH ST.
Panama City, FL 32405

I am enclosing the listing of a four voice music program for Tandy's TRS80C micro. Attached to the listing is a hex dump of the music for Country Roads by John Denver.

This program is based on Chamberlin's algorithm, that was published in the Sept 77 issue of Byte. The first table is the digitized form of one cycle of the organ sound. This consists of the fundamental, second harmonic and the third harmonic at half amplitude. The second table is the note increment table. This is equivalent to the keyboard of a musical instrument. Note that adjacent increments are related by the twelfth root of two.

The program is written in a pseudo Pascal structure; the main program is at the end and consists of calls to procedures. The first procedure initializes the variables and turns on the sound. The next procedure reads the duration of the note to be played. If the duration is zero, the song is terminated and control is returned to Basic. Procedure NOTE reads the next four items in the music. These are the values for pointers into the note table. Each will determine what note its voice will be playing.

The procedure PLAY consists of a tied loop of about 143 microseconds duration. Each time the loop is executed a sample of the four voices are summed and output to the D/A converter. At the same time a number corresponding to the Tempo is decremented and when it reaches zero the duration count is decremented. This means that the duration of the note played is dependent on the tempo and the duration read from the music.

The main program then loops and procures the next note from the music. nd on and on till the duration is zero.

I hope that you and your readers may find some interest in this program. I don't seem to be able to find much published on machine language programs for the TRS80C.

My set up consists of a 88-50 buss computer operating under FLEX9 connected to my TRS80C by means of the RS-232 port. The downloading and uploading is by means of Micro Works EBUG. I have been able to do this at 9600 baud.

I also am enclosing a cassette with Country Roads on it. You may be able to find a TRS80C and play it.

Chell Dildy
Clell Dildy

```

*****
* PROGRAM TO PLAY FOUR PART MUSIC ON *
* THE IBMPAK MICROCOMPUTER *
* BY *
* CLELL A. DILDY JR. *
* NOVEMBER 24, 1981 *
* *
* USING AN ALGORITHM BY *
* HAL CHAMBERLIN *
* PUBLISHED IN THE SEPT 1977 ISSUE OF *
* "BYTE" *
*****

NAM          MUSIC TRS80C
OPT          PAB

0040          EQU    $40          RESET VECTOR
FFFE          EQU    $FFFE       A-D-TO-D CONVERTER
FF20          EQU    $FF20       TURN ON AUDIO TO TV
FF23          EQU    $FF23

0040          ORG    $40

1          MVARA:  RMB    2          GONG POINTER
2          DUA:    RMB    1          NOTE DURATION
3          VOICE1:  RMB    3          VOICE POINTERS
4          VOICE2:  RMB    3
5          VOICE3:  RMB    3
6          VOICE4:  RMB    3
7          INC1:    RMB    2          [INCREMENTS FOR THE
8          INC2:    RMB    2          VOICE POINTERS
9          INC3:    RMB    2
10         INC4:    RMB    2

1800          ORG    $1000

*****
* WAVEFORM TABLE FOR ORGAN SOUND *
* MFT          FCB    $00,$0E,$0F,$11,$12,$14,$15,$16
1000         FCB    $18,$19,$1B,$1C,$1D,$1F,$20,$22
1004         FCB    $23,$26,$27,$29,$2A,$2B,$2D,$2E
1008         FCB    $30,$31,$32,$34,$35,$37,$38,$39
1012         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1016         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1020         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1024         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1028         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1032         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1036         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1040         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1044         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1048         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1052         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1056         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1060         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1064         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1068         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1072         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1076         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1080         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1084         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1088         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1092         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1096         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1100         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1104         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1108         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1112         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1116         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1120         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1124         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1128         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1132         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1136         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1140         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1144         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1148         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1152         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1156         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1160         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1164         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1168         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1172         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1176         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1180         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1184         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1188         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1192         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1196         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1200         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1204         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1208         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1212         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1216         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1220         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1224         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1228         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1232         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1236         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1240         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1244         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1248         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1252         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1256         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1260         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1264         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1268         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1272         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1276         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1280         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1284         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1288         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1292         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1296         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1300         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1304         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1308         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1312         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1316         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1320         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1324         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1328         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1332         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1336         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1340         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1344         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1348         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1352         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1356         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1360         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1364         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1368         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1372         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1376         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1380         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1384         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1388         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1392         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1396         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1400         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1404         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1408         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1412         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1416         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1420         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1424         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1428         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1432         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1436         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1440         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1444         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1448         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1452         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1456         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1460         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1464         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1468         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1472         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1476         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1480         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1484         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1488         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1492         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1496         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1500         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1504         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1508         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1512         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1516         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1520         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1524         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1528         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1532         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1536         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1540         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1544         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1548         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1552         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1556         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1560         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1564         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1568         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1572         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1576         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1580         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1584         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1588         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1592         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1596         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1600         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1604         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1608         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1612         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1616         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1620         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1624         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1628         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1632         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1636         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1640         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1644         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1648         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1652         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1656         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1660         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1664         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1668         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1672         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1676         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1680         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1684         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1688         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1692         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1696         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1700         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1704         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1708         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1712         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1716         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1720         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1724         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1728         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1732         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1736         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1740         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1744         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1748         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1752         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1756         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1760         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1764         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1768         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1772         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1776         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1780         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1784         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1788         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1792         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1796         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1800         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1804         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1808         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1812         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1816         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1820         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1824         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1828         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1832         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1836         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1840         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1844         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1848         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1852         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1856         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1860         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1864         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1868         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1872         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1876         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1880         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1884         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1888         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1892         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1896         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1900         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1904         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E
1908         FCB    $8F,$90,$91,$93,$94,$96,$97,$99
1912         FCB    $9A,$9B,$9C,$9E,$9F,$A0,$A1,$A3
1916         FCB    $A4,$A5,$A6,$A8,$A9,$AB,$AC,$AE
1920         FCB    $AF,$B0,$B1,$B3,$B4,$B6,$B7,$B9
1924         FCB    $BA,$BB,$BC,$BE,$BF,$C0,$C1,$C3
1928         FCB    $C4,$C5,$C6,$C8,$C9,$CB,$CC,$CE
1932         FCB    $CF,$D0,$D1,$D3,$D4,$D6,$D7,$D9
1936         FCB    $DA,$DB,$DC,$DE,$DF,$E0,$E1,$E3
1940         FCB    $E4,$E5,$E6,$E8,$E9,$EB,$EC,$EE
1944         FCB    $EF,$F0,$F1,$F3,$F4,$F6,$F7,$F9
1948         FCB    $FA,$FB,$FC,$FE,$FF,$00,$01,$03
1952         FCB    $04,$05,$06,$08,$09,$0B,$0C,$0E
1956         FCB    $0F,$10,$11,$13,$14,$16,$17,$19
1960         FCB    $1A,$1B,$1C,$1E,$1F,$20,$21,$23
1964         FCB    $24,$25,$26,$28,$29,$2B,$2C,$2E
1968         FCB    $2F,$30,$31,$33,$34,$36,$37,$39
1972         FCB    $3A,$3B,$3C,$3E,$3F,$40,$41,$43
1976         FCB    $44,$45,$46,$48,$49,$4B,$4C,$4E
1980         FCB    $4F,$50,$51,$53,$54,$56,$57,$59
1984         FCB    $5A,$5B,$5C,$5E,$5F,$60,$61,$63
1988         FCB    $64,$65,$66,$68,$69,$6B,$6C,$6E
1992         FCB    $6F,$70,$71,$73,$74,$76,$77,$79
1996         FCB    $7A,$7B,$7C,$7E,$7F,$80,$81,$83
1999         FCB    $84,$85,$86,$88,$89,$8B,$8C,$8E

```

```

75 106B 04 04 04 04 FCB 804,804,804,803,803,803,804
106C 03 03 03 03
76 106D 04 04 04 04 FCB 804,804,804,804,806,806,806
106E 04 04 04 04
106F 07 07 07 07 FCB 807,807,807,808,804,804,808,808
106G 0A 0A 0A 0A
78
79
80
81
82
83
84 1100 00 00 02 6F TABL FCB 800,800,802,80F,802,804,80C,81B
1104 02 04 02 8B
85 1108 02 04 03 10 FCB 802,8E4,803,810,803,80F,803,871
110C 03 0F 03 71
86 1110 03 05 03 0C FCB 803,8A5,803,80C,804,817,804,85A
1114 04 17 04 56
87 1118 04 08 04 00 FCB 804,808,844,82D,805,82B,80C,476
111C 05 28 05 76
88 1120 05 06 06 21 FCB 805,8C9,806,821,806,87F,806,8E2
1124 06 0F 06 12
89 1128 07 0A 07 89 FCB 807,844,807,889,808,82F,808,84C
112C 08 2F 08 4C
90 1130 09 00 09 8B FCB 809,830,809,88B,80A,830,80A,8ED
1134 0A 00 0A ED
91 1138 0B 03 0C 43 FCB 80B,893,80C,843,80C,8FE,80D,8C4
113C 0C 0E 0C 04
92 1140 0E 0F 0F 73 FCB 80E,875,80F,873,810,85F,811,858
1144 10 5F 11 58
93 1148 12 60 13 77 FCB 812,860,813,877,814,8A0,815,8DA
114C 14 0A 15 DA
94 1150 17 26 18 87 FCB 817,826,818,887,819,8FC,81B,88B
1154 19 0C 1B 8B
95 1158 10 2B 1E 07 FCB 81D,82B,81E,8E7,820,8BE,822,889
115C 20 BE 22 8B
96 1160 24 0C 26 EF FCB 824,8C8,826,8EF,829,840,82B,884
1164 29 40 2B 84
97 1168 2E 40 31 0E FCB 82E,84D,831,80E,833,8F9,837,810
116C 33 F9 37 10
98 1170 3A 57 40 CF FCB 83A,837,83D,8CF,841,87C,845,889
1174 41 7C 45 6D
99 1178 49 81 4D 0F FCB 849,881,84D,80F,85C,881,857,869
117C 52 81 57 69
100 1180 5C 9B 62 1D FCB 85C,89B,862,81D
101
102
103 1184 16 00B2
104
105
106
107
108 1187 86 3F INIT LDA 863F TURN ON AUDIO
109 1189 87 FF23 STA SWITCH
110 118C 30 80 FF7D LEA R1 PTR,PCR INITIALIZE
111 1194 9F 43 VOICE1 WAVEFORM POINTERS
112 1192 9F 46 STR VOICE2
113 1194 9F 49 STR VOICE3
114 1196 9F 4C STR VOICE4
115 1198 30 80 00B0 LEA R1 PTR,PCR MUSIC STARTING PLACE
116 119C 9F 40 STR R1
117 119E 39 00 RTS
118
119
120
121
122 119F 9E 40
123 11A1 86 80
124 11A3 97 42
125 11A5 16
126
127
128
129
130
131 11A6 31 80 FF5A NOTE LEA1 TABL,PCR POINT TO NOTE TABLE
132 11A8 AB 8C LDA A,Y GET NEXT NOTE FOR VOICE 1
133 11AC EE 86 LDA A,Y GET INCREMENT FOR VOICE 1
134 11AE DF 4F STU INC1 STORE IT
135 11B0 A6 80 LDA A,Y GET NEXT NOTE FOR VOICE 2
136 11B2 EE A6 LDA A,Y GET INCREMENT FOR VOICE 2
137 11B4 DF 51 STU INC2 STORE IT
138 11B6 A6 80 LDA A,Y GET NEXT NOTE FOR VOICE 3
139 11B8 EE A6 LDA A,Y GET INCREMENT FOR VOICE 3
140 11BA DF 53 STU INC3 STORE IT
141 11BC A6 80 LDA A,Y GET NEXT NOTE FOR VOICE 4
142 11BE EE A6 LDA A,Y GET INCREMENT FOR VOICE 4
143 11C0 DF 55 STU INC4 STORE IT
144 11C2 9F 40 STA R1 SAVE MUSIC POINTER
145 11C4 39 00 RTS END NOTE
146
147
148
149
150 11C5 108E 00A8
151 11C9 A6 9F 0043 PLAY LDY STEPNO
152 11CD AB 9F 0046 PLAY LDA [VOICE1] ADD UP 4 VOICE SAMPLES
153 11D1 A9 9F 0049 ADDA [VOICE2]
154 11D5 A9 9F 004C ADDA [VOICE3]
155 11D9 87 FF20 STA PCRT SUM TO -TO-A CONVERTER
156 11DC DC 44 LDD VOICE1-1 ADD INCREMENTS TO POINTERS
157 11DE D3 4F INCI FOR THE 4 VOICES
158 11E0 DD 44 LDD VOICE1-1 VOICE1
159 11E2 DC 47 LDD VOICE2-1 VOICE2
160 11E4 D3 51 ADD INC2
161 11E6 DD 47 LDD VOICE2-1 VOICE2
162 11E8 DC 4A LDD VOICE3-1 VOICE3
163 11EA D3 53 ADD INC3
164 11EC DD 4A LDD VOICE3-1 VOICE3
165 11EE DC 4D LDD VOICE4-1 VOICE4
166 11F0 D3 55 ADD INC4
167 11F2 DD 4D LDD VOICE4-1 VOICE4
168 11F4 31 82 LEA A,Y
169 11F6 2A 0A BNE TIMNAS BRANCH IF NOT RUN OUT
170 11FB 0A 42 DEC DUR DECREMENT & CHECK DURATION
171 11FD 27 0C BEQ ENDNOT JUMP OUT IF END OF NOTE
172 11FC 20 C7 BRA PLAY
173 11FE A6 84 TIMNAS LDA A, PCRT ADDING TO HAVE
174 1200 20 00 BRA WAB1E1 LOOPS THE SAME
175 1202 20 00 WAB1E1 BRA WAB1E2
176 1204 20 00 WAB1E2 BRA WAB1E3
177 1206 20 C1 WAB1E3 BRA PLAY CONTINUE PLAYING
178 1208 39 00 ENDNOT RTS END PLAY
179
180
181
182
183 1209 17 FF7B MUSIC LBSH INIT INITIALIZE

```

MUSIC 19680C

```

184 120C 8D V1 LOOP WAB1E1 WAB1E1
185 120E 81 00 WAB1E1 WAB1E1
186 1210 26 04 WAB1E1 WAB1E1
187 1212 4E 9F FF7E WAB1E1 WAB1E1
188 1214 8D 0E OVER WAB1E1 WAB1E1
189 1216 8D 0E OVER WAB1E1 WAB1E1
190 121A 20 F0 WAB1E1 WAB1E1
191
192
193 121C WAB1E1 WAB1E1
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
2196
2197
2198
2199
2200
2201
2202
2203
2204
2205
2206
2207
2208
2209
2210
2211
2212
22
```


CARDORY is a very unique cartridge for the TRS-80 Color Computer. It contains four twenty four pin sockets and an address decoder on a high quality, double sided, plated through printed circuit board. Depending on the version you get. (version 1.1 for EPROMS and version 1.2 for RAMS). You are able to select either 2716 Erasable Programmable Read Only Memories (EPROMS) or Random Access Memories (RAMS). You are also able to mix in 2K steps EPROMS and RAMS from the cartridge address 0000 Hex (49152) thru FEFF (65279).

Installing 8K of RAM or ROM is very simple, just plug them in the sockets provided. Installing 16K of RAM or ROM requires the piggybacking of four chips on top of the first four installed into the sockets. Then adding the chip select lines for the four piggybacked chips. When piggybacking the chips you must be careful not to overheat the chips, as the heat will damage them. Make sure the top chips are pushed down tight against the first or bottom chips so that the top of the cartridge will fit properly. **CARDORY** is built differently than the normal ROM packs available to allow for the piggybacking of chips inside.

CARDORY cartridge is orange in color and approximately the same physical outside size as other ROM PACKS. But the main difference is inside. **CARDORY** installs easily into the color computers cartridge slot, with no alignment problems that might be associated with ROM PACKS that are smaller than the original design.

The on-board address decoding selects address normally associated with the cartridge slot. Even though these addresses are not continuous with the lower, on-board computer memory, this is not a problem. Memory at the cartridge location may be accessed using basic with POKE and USR commands. Machine language programs may be loaded directly into the cartridge address.

I have installed 16K of RAM into my **CARDORY** cartridge, this gives me 16,127 bytes of memory. (0000 through FEFF) The last 255 bytes of memory is not accessible. Because, Basic uses these addresses for input output and vectors. I have now relocated most of my machine language programs to load into **CARDORY** location. Which frees up most of my lower 512K of memory for use by my programs. Almost any position independent machine language program should load and execute at this new location. And this additional memory gives my computer almost 48K of memory. I have found this amount of memory very useful at times. Try **CARDORY**, I think you will like it, I do.

CARDORY and the recommended ROMS and RAMS are available from Micro Labs, Inc. 902 Pinecrest, Richardson, Tx. 75080. **CARDORY** without memory is \$24.95. 214-235-0915

Douglas R. Cook
3895 W. Westland Dr.
W. Jordan, Utah 84084

GIMIX INC. 1337 WEST 37TH PLACE • CHICAGO, ILLINOIS 60609 • (312) 927-5510 • TWX 910-221-4055

Press Release

GIMIX will be exhibiting at MCC in Houston June 7-10, 1982. We will have guest tickets available that allow the user to gain free admission to the Exhibits. Please mail requests for these to **GIMIX**, 1337 W. 37th Place, Chicago IL 60609.

GIMIX will also be represented at the Micromare (MS-9) seminar in New Orleans from May 14-16. For information, contact Micromare.



COMPUTER SYSTEMS CENTER
OF ST. LOUIS, INC.
13461 OLIVE BLVD.
CHESTERFIELD, MO. 63017
(314) 576-5020

January 13, 1982

Mr. Don Williams, Publisher
68 Micro Journal
5988 Cassandra Smith Road
Benson, TN 37303

Dear Don,

The new version 1.8 of Southwest Technical Products Corp.'s **SBUG** (tm) 6809 monitor contains some unpleasant surprises for those who have developed the questionable habit of using undocumented **SBUG** entry points.

SWTPC has published only one manual for **SBUG**, and that is for the original version 1.5, which was distributed in masked-ROM from summer of 1979 until the clock speed was upped to 2 MHz in 1980. At that time, they began sending out version 1.7 in EPROM, which has a longer minifloppy boot delay constant for the faster clock speed. Version 1.5 will not boot a minifloppy at 2 MHz. Also the NMI (ABORT button) is vectored through the SWI RAM address. I don't know what happened to version 1.6.

So far, no big deal, since nothing has moved around. Enter version 1.8 and the fun begins! **SWTPC** made a marginally useful change at the expense of re-assembling the whole program. Version 1.8 allows lower-case command and hex inputs, where earlier versions required upper case. As long as you use only the documented entry points (which are in a jump table and require indirect addressing), there is no problem. However, there are lots of undocumented goodies that have now moved. Here is a list of some of the likely ones:

ENTRY	old	1.8
START	FB14	FB14 cold SBUG entry (unchanged)
COMMND	FB61	FB61 command loop (unchanged)
PRERR	FA9C	FAA2 print error message
GETRNG	FD28	FD27 get address range
GET4HX	FD2B	FD32 get address
GET2HX	FD3C	FD43 get hex byte
GET1HX	FD4F	FD56 get single hex character
PR4HEX	FD6A	FD7C print address
PR2HEX	FD72	FD84 print hex byte
PR1HEX	FD7E	FD98 print single hex character
PMESS	FD9E	FD09 print CRLF, then string
CRLP	FDAA	FD04 print CR and LF
PRDATA	FDAE	FDC9 print string w/o CRLF
INCHNO	FDBA	FDC8 input char. with echo
INCHNR	FDC9	FDD2 input single char. w/o echo
C BCK	FDD8	FDE2 check if key struck
OUT2SP	FDD8	FDED output 2 spaces
OUTSP	FDDD	FDEF output single space
OUTCHR	FDDF	FDF1 output a character
INITIO	FDF1	FEB3 initialize ACIA

Also please note a long-standing typo on page 6 of the **SBUG** manual: all references to addresses 5D8xx should be to 5DFxx.

The above information is provided for your convenience. Use it at your own risk....**SBUG** will probably change again.

Sincerely,

Joe Turner

H. Joseph Turner, Jr.
President

Don Williams Mag.,
68 Micro Journal,
5900 Cassandra Smith,
Computer Publishing Center,
PO Box 849,
Benson, TN 37303.
U.S.A.



Dear Don,

You have published several programs to set and reset the flex pause feature but all are transient commands. Surely the quick and easy way which does not involve starting up the disk or loading the head etc. is to use the memory resident user command table provided for by TBC. The table can be placed in ROM or RAM (mine's in RAM and loads as part of the STARTUP) and is simply

CHC	# AC12	(Toll FLEB 2 to refer to user table)
FDB	# 9040	(or wherever table is)
CHC	# 9040	(table start)
FCB	# 48	'B' for hold. i.e. set pause
FCB	0	
FDB	PADSON	
FCB	# 52	'B' for Puh. i.e. pause off
FCB	0	
FDB	PADSON	
FCB	0	table terminator

PAUSON	LDAA	# FF	128 High Street
	NRA	STAF	Horne Bay
			Keat
PAUSOP	CLRA		CT8 6JV
			England.
STAF	STAA	# AC05	
	JMP	# AD03	

ALL-IN-ONE EDITOR

I had my microcomputer system modified so that I could purchase a text editing program. Since AAA Chicago Computer Center was the only vendor that was able to modify my system, I thought that it was reasonable to purchase their text editing program. After using the editing system I have decided that it is the best 6800/6809 editor available. The AAA All-in-One Editor is a line editor that has most of the advantages of a line editor combined with the advantages of a screen editor. When the editor is in the input mode, lines of text are entered. The text appears on the monitor in the same way as text appears on the monitor of a system with a screen editor. That is, the editor does not require (or

supply) line numbers for the lines of text that are entered. A line of text can be modified before the carriage return key is depressed.

When the escape key is depressed, the editor enters the command mode. Commands such as U(P), N(EXT), T(OP), B(OTTOM), and F(IND) allow the user to locate any line in the text. For example, U5 moves the line pointer up five lines. A powerful O(VERLAY) command system allows the user to insert characters in a line, delete parts of a line, and move from one position to another in the line just as one would in a screen editor. The O(VERLAY) command also allows the user to change a portion of the line and retain or delete the remainder of the line. The commands for locating lines make it easy to locate the line that is to be modified by the O(VERLAY) command. One can effectively reenter the input mode by using the I(N)S(ERT) command. The user can start to I(N)S(ERT) text at any point in the file.

After margins are S(ET) the W(IGGLE) command is used to move the text until each line has an optimum number of words. The W(IGGLE) command eliminates ragged margins and can be used in conjunction with the J(USTIFY) command to right justify margins.

The FLEX version of the editor is called i the same way as any disk utility command. The editor has its own commands for interacting with the disk operating system. For example, entering Q(UIT) will cause the system to request FILE? If one enters O(PART), the editor will create a file named PART1.TXT using disk drive 0. This file will contain the entire text that was entered in the editor buffer. If the disk already has a file named PART1.TXT, the editor will initiate appropriate prompts to determine if the file should be deleted. Commands such as A(PPEND) allow the user to create a file that is much longer than a file that can be maintained in the editor buffer. A file can be A(PPEND)ed to a second file at any location in the second file. If a file is longer than the text buffer, the M(ORE) command is used after one completes modifications of the part of the file that is in the text buffer. In long text files, portions can be moved from one location to another by creating any number of "third" disk files for later reinsertion into the text.

I have only touched on some of the features of the editor. For example, it has complete provisions for changing strings of text, deleting any number of lines of text, inserting text, setting margins, setting page length, tabulating, and producing hard copy. The editor can also be used to create mailing lists and labels.

It is difficult to communicate the care that went into the design of the editor. Commands can be given with upper or lower case letters. In addition, more than one command can be given before entering a carriage return. Instructions are supplied so that

the user can modify the letter or symbol for many commands. For example, the user can switch from A to another symbol for indicating the insertion of text. Most changes of symbols can be made in the command mode without having to modify machine language code.

Once the basics of the editor are mastered, the manual for the editor is very easy to use. The commands are described in alphabetical order to facilitate locating a specific command. Important machine language program locations that can be modified by the user are given at the end of the manual.

I heartily recommend the AAA Chicago Computer Center All-in-One Editor. The people at AAA Chicago Computer Center will take the time to explain what their software (and hardware) can do. They are available to help users with any questions they may have.

Allen H. Wolach, Ph. D.
Illinois Institute of Technology

E. M. (Bud) Pass, Ph. D.
COMPUTER SYSTEMS CONSULTANTS
1454 Latte Lane, N. W.
Conyers, GA 30207

The attached program allows direct loading of Motorola "SI" formatted files into FLEX (its Technical Systems Consultants) binary files. It is especially useful for loading object programs which conflict with FLEX or would load into non-RAM address ranges. It is called as follows:

SICONV INPUTFILE OUTPUTFILE

where INPUTFILE is the name of the "SI" file (with default suffix of .T) and OUTPUTFILE is the name of the binary file (with default suffix of .BIN). Although the program was written for the 6809, it may be made to run on the 6808 without too much trouble.

When the program encounters an "SI" beginning a line, it generates a code segment for the indicated address, length, and contents. When it encounters an "S9", it generates a transfer address and terminates execution. If it encounters an I/O error, it prints the standard FLEX error message and terminates. The hex digits and checksums are not checked for validity.

Sincerely,

Bud Pass
E.M. (Bud) Pass
President

SI TO FLEX OBJECT CONVERSION

```

*
* CONVE T FROM SI TO FLEX OBJECT FORMAT
*
* M IN DISK EQUATES
*
C640 FCB EQU $C640
D406 FMS EQU $D406
D403 FMSCLS EQU $D403
CD03 WARMS EQU $CD03
CD15 GETCHR EQU $CD15
CD16 PUTCHR EQU $CD16
CD1E PSTARG EQU $CD1E
CD24 PCRLF EQU $CD24
CD2D GETFIL EQU $CD2D
CD33 SETEXT EQU $CD33
CD3F RPTERR EQU $CD3F
CD45 OUTADR EQU $CD45

C100 ORG $C100

* MAIN ST RTS HERE
*
>C100 16 U001 SICONV LBR CV1
C103 01 VN FCB 1 VERSION NUMBER
*
C104 BE C648 CV1 LDX #CB POINT TO FCB
C107 BD CD2D JSR GETFIL G T THE FILE NAME
C10A 25 0C BCS DSKERR
C10C 86 01 LDA #1 S T FOR RE
C10E A7 84 STA #X SAVE IN FCB
C110 8B CD33 JSR SETEXT SET DEFAULT EXT
C113 BD D406 JSK FMS CALL FMS
C116 27 0C BEO CV2
C118 BD CD3F DSKERR JSK RPTERR REPORT ERROR
C11B BD D403 DSKERR2 JSK FMSCLS CLOSE ALL FILES
C11E BD CD24 JSR PCRLF
C121 7E CD03 JHP WARMS RETURN TO FLEX
C124 BE C234 CV2 LDX #PCB2 POINT TO FCB
C127 BD CD2D JSR GETFIL GET FILE NAME
C12A 25 EC BCS DSKERR ERROR?
C12C 4F CLRA SET EXTENSION
C12D BD CD33 JSR SETEXT
C130 86 02 LDA #2 OP N FOR WRITE
C132 A7 84 STA #X
C134 BD D406 JSR FMS CALL FMS
C137 26 DF BNE DSKERR ERROR?
C139 86 FF LDA #FFF NO COMP ESSION
C13B A7 88 38 STA #X
C13E BD CD24 JSR PCRLF
C141 14 002C LBRA NEXT GET STARTED
C144 BE C234 PUT LDX #PCB2 POINT TO WRITE
C147 BD D406 JSR FMS WRITS CHARACTER
C14A 26 CC BNE DSKERR ERROR?
C14C 39 RTS RETURN
C14D BE C640 GET LDX #FCB POINT TO READ
C150 34 84 PSMS B GET CHARACTER
C152 BD D406 JSR FMS
C155 35 84 PULS B
C157 27 F3 BEQ RET ERROR?
C159 A6 81 LDA #X CHECK ERROR
C15B 81 80 CHPA #0 IS IT EOF?
C15D 26 B9 BNE DSKERR
C15F BE C234 CLOSE LDX #PCB2 POINT TO WRITE
C162 86 84 LDA #4 CLOSE FILE
C164 A7 84 STA #X
C166 BD D406 JSR FMS CALL FMS
C169 1026 FFAB LBNE DSKERR ERROR?
C16D 17 FFAB LBSR DSKERR2 RETURN TO FLEX
C170 17 FF0A NEXT LBSR GET GET A BYTE
C173 81 53 CHPA #53 CHECK FOR S
C175 26 F9 BNE NEXT
C177 17 FF03 LBSR GET
C17A 81 31 CHPA #31 CHECK FOR 1

```

```

C17C 27 38      BEQ  GOTS1
C17E 81 39      CMPA  #539      CHECK OR 9
C180 26 EE      BNE  N XT
>C182 17 FFC8    GOTS9  LBSR  GET      IGNORE COUNT
C185 17 FFC5      LBSR  GET
C188 06 16      LDA  #516      SET XPER ADDR
>C18A 17 FFB7    LBSR  PUT      GET ADDRESS
C18D 17 FFB0      LBSR  GET
C190 17 00B3      LBSR  ASCHX1
>C193 17 FFB7    LBSR  GET
C196 17 00B0      LBSR  ASCHX2
>C199 17 FFA8    LBSR  PUT
>C19C 17 FFAE    LBSR  GET
>C19F 17 0074    LBSR  ASCHX1
>C1A2 17 FFA8    LBSR  GET
>C1A5 17 007D    LBSR  ASCHX2
>C1A8 17 FF99    LBSR  PUT
>C1AB 16 FFB1    LBSR  CLOSE  STOP
C1AE 86 02      LDA  #502      MARK COD SEGMENT
>C1B0 17 FF91    LBSR  PUT      GET COUNT
>C1B3 17 FF97    LBSR  GET
>C1B6 17 005D    LBSR  ASCHX1
>C1B9 17 FF91    LBSR  GET
>C1BC 17 0066    LBSR  ASCHX2
C1BF 80 03      SUBA  #503
C1C1 B7 C103     STA  VN
>C1C4 17 FF86    LBSR  GET      GET ADDRESS
>C1C7 17 004C    LBSR  ASCHX1
>C1CA 17 FF80    LBSR  GET
>C1CD 17 0055    LBSR  ASCHX2
C1D0 B7 C232     STA  ADDRES
C1D3 17 FF6E    LBSR  PUT
C1D6 17 FF74    LBSR  GET
>C1D9 17 003A    LBSR  ASCH 1
C1DC 17 FF6E    LBSR  GET
>C1DF 17 0043    LBSR  ASCH 2
C1E2 B7 C233     STA  ADDRESS+1
C1E5 17 FF5C    LBSR  PUT      SET COUNT
C1E8 B6 C103     LDA  VN
C1EB 17 FF56    LBSR  PUT
C1EE 8E C232     LDX  #ADDRESS
C1F1 B0 CD45     JSR  OUTADR
C1F4 86 0D      LDAA  #500
C1F6 B0 CD18     JSR  PUTC R
C1F9 17 FF51    LBSR  GET      GET A BYTE
>C1FC 17 0017    LBSR  ASCHX1
C1FF 17 FF4B    LBSR  GET
>C202 17 0020    LBSR  ASCHX2
C205 17 FF3C    LBSR  PUT
C208 7A C103     DEC  VN
C20B 26 EC      BNE  LOOP
C20D 17 FF3D    LBSR  GET      IGNORE COUNTER
C210 17 FF3A    LBSR  GET
C213 16 FF5A    LBSR  ME T      BACK OR NEXT LINE
C216 80 30      ASCHX1 SUBA  #530      FIRST HEX DIGIT
C218 B1 09      CMPA  #509
C21A 2F 02      BLE  ASCHX1
C21C 80 07      SUBA  #507
C21E 1F 09      ASCHX1 TFR  A,B
C220 58        ASLB
C221 56        ASLB
C222 58        ASLB
C223 58        ASLB
C224 39        RTS
C225 80 30      ASCHX2 SUBA  #530      SECOND HEX DIGIT
C227 B1 09      CMPA  #509
C229 2F 02      BLE  ASCHX2
C22B 80 07      SUBA  #507
C22D 34 04      ASCHX2 PSHS  B
C22F AB E0      ADDA  #5
C231 39        RTS
C232 0000      *      ADDRES FDB  #0000
C234          *      FC02  RMB  320
          *      END  SICOMV

```

CALCOMP 143 DISK DRIVES WITH /09 SYSTEM

H.Kitazume

Here I would like to report my struggle around /09 system. I hope that this is useful to other readers.

- I had
- 1) 6800 with 40 K RAM from SWTPC
 - 2) DMFA-1 (Calcomp 143) 8' disk system.
 - 3) H-9 terminal from Heath kit (modified to 24 lines)
 - 4) Dot matrix printer from Okidata.
 - 5) IBM selectric printer.

I was using that system for 3 years except Okidata printer, which I added one year ago.

In June 1981 I bought

- 1) /09 6809 computer with 56 K RAM (2 MHz clock)
- 2) DMF-2 disk controller board from SWTPC.

The front panel of /09 was damaged during the shipment so new replacement was sent soon. The /09 was working properly and I was delighted with the rapid advance of technology even in hobby world.

- In July 1981 I bought
- 1) FLEX09 with Editor and Assembler
 - 2) Text processor
 - 3) Basic interpreter from TSC.

Meanwhile I connected the DMF-2 disk controller board to the Calcomp 143 disk drives and run the diagnostic program from SWTPC. This did not work well at all. Nothing was mentioned for upgrading DFMA-1 in the manual so I studied myself and learned following.

- 1) pin configuration of motor control is different.
 - 2) pin assignment of TC43 (track above 43) is different.
 - 3) track access time of Calcomp (6 msec.) is slower than that of Data Track 8 (3 msec.).
- I modified these hardware and software and worked well.

I tried to boot FLEX09 from TSC but never succeeded. I changed the clock to 1 MHz and tried to patch loader but never worked well. I contacted to SWTPC and TSC but no help at all. SWTPC checked my DMF-2 controller and TSC checked FLEX09 diskette and both were all right.

Finally I traded off with following system which worked.

- 1) /09 with 1 MHz clock.
 - 2) DMFA-1 disk controller, modified the address to F000.
- This was so far satisfactory, although DMF-2 controller board was useless.

I needed PROM programmer and I learned that programs for PR-M program board is available as READPROM.CMD and WRITPROM.CMD as utility programs in FLEX09 from SWTPC. I bought the FLEX09 ver 2.8 and I realized that the FLEX from SWTPC has much more utility programs and better printer handling routine but still cheap. Also I noticed that this FLEX can be bootable with DPM-2 controller connected to Calcomp 143. The software patches were included and "hardware modification" was referred to AN#102.

I succeeded to boot the FLEX with my system and confirmed that my modification of DMF-2 board was adequate. Then I tried to change to 2 MHz clock and this was almost successful. Only thing that has not been solved is improper functioning of NEWDISK command for which I have to switch back the system clock to 1 MHz in each time I need disk formatting.

Now my current system is

- 1) /09 with switchable 1 and 2 MHz clock.
- 2) DMF-2 disk controller with Calcomp 143 drives.

Following are the suggestions to use Calcomp 143 in /09 system.

- 1) To use DMF-2 board with Calcomp 143
 - (1) modification of motor control and TC43 (track above 43) pin configurations -1).
 - (2) software patch for 6 msec. track access time -2).
 - (3) software patch to increase the waiting time in DCHCK disk diver routine as follows (for FLEX09 ver 2.8)

DF93 from 8D 00	to DF93 BF DF9C
DF95 39	DF96 7A DF9C
	DF99 26 FB
	DF9B 39

- 2) To use DMFA-1 system

- (1) make sure to place a jumper BA#85 at MP-09 CPU board.
- (2) change the address of controller to F000 -3).
- (3) software patch -1).
- (4) I am not sure if it runs at 2 MHz.

I realized that I wasted time since nobody from SWTPC gave me enough and adequate information for upgrading DMFA-1 system by DMF-2 controller board or nothing was done by TSC to make FLEX09 bootable at Calcomp disk drives.

I still feel that both companies are good since they have been trying to release powerful systems at affordable price. If they can be (and they must do, I believe) more kind and consciencous to customers, they are the best.

I am using my system for 1) data base management, 2) statistical analysis for my research projects and 3) data analysis and word processing. I played games at 6800 but I do not have programs for 6809.

I am planning to upgrade my system to S/09 (128 K RAM) and run FORTRAN compiler.

I have another project which is to upgrade the old 6800 system to 6809 and make it compact to fit in one case which contains 6809 CPU board, 32K+16K RAM, 8" disk controller from GIMIX and one Siemens 8" single density disk drive. I destroyed old MP-A2 CPU card during the modification and probably have to buy 6809 CPU board from SWTPC.

References

- 1) SWTPC modification - application notice AN #125A Jan. 8, 1981.
- 2) SWTPC modification - application notice AN #102 Nov. 21, 1979.
- 3) 68 Micro Journal: page 30, March 1980.

6502/6809 MICRO

The April Issue of the 6502/6809 Micro is directed toward the 6809, so we have been informed. Many have complained, to us in the past, that there has been very little 6809 in this magazine, I trust that those who have subscribed will be more satisfied in the future.

DMW - - -

CLASSIFIED ADS

MIDWEST SCIENTIFIC MSI, 120K, 2 MHZ, 6800, DUAL FD-8 8" DISK SYSTEM, MULTI USER SDOS FILES, MULTI DISK FLEX, SDOS SYSGEN FILES, TSC 6800 TO 6809 CROSS ASSEMBLER, FLEX SORT/MERGE, TSC 6800 DEBUG PACKAGE, TSC 6800 BASIC, HEMENWAY ASSOCIATES PROGRAMS, TSC BUSINESS BASIC, TSC TEXT PROCESSOR, SORT/MERGE PROGRAMS, SOFTWARE LIBRARY PROGRAMS, FLEX UTILITY PROGRAM, AND MANUALS, WITH MUCH MORE.
NEW NEVER USED REGULAR \$13,000 WITH SOFTWARE, AS IS \$4995. CONTACT LEW 1-615-842-4600 10AM-5PM.

TANO 56K DUAL SERIAL PORTS, DUAL 5" DISK DRIVES, LIKE NEW, WHOLESale \$5300 WILL TAKE \$2995. 1 CT-82 CRT TERMINAL (NEW IN BOX - NEVER USED) \$795. 1 CT-82 CRT TERMINAL (USED) WORKS FINE \$650. PR-40 PRINTER, EXTRA PAPER, AND RIBBONS, \$95.
LEW 10AM-5PM 1-615-842-4600

PERCOM DISC CONTROLLER BOARD AND CABLE, \$125. TWO SA-400 DISC DRIVES, \$225 EA. ABOVE AS PACKAGE DEAL, \$550. TIM TIBBOTT, 1812F WOODNAR DR., HOUGHTON, MI 49931. (906) 482-8806.

SWTPC, MP-A, BFD-68, MP-1632K, MP-S, AC-30 DOS 68, \$750. 4 SWTPC MP-M 4K BOARDS \$100. STEVE LOUIE 1444 MORGANTOWN WICHITA, KS 67212 (316) 722-7651

"6800 TRACE AND DISASSEMBLE PROGRAM. INCLUDES LISTING AND MANUAL - \$10.00. RICHARD CARICKHOFF, 812 PULASKI DRIVE, LANSDALE, PA. 19446."

SWTPC 6800-20K, AC-30, XTRA PARTS, SOFTWARE- BASIC, PASCAL, UTILITIES. \$325; OR SEND FOR LIST OF PARTICULARS. J. O'LOUGHLIN, 908 SALEM DR., HURON OHIO 44839

"UPGRADE SALE: GIMIX SINGLE DENSITY DISK CONTROLLER (THE ONE YOU'VE BEEN READING ABOUT)- \$175. TWO SEALS 8K MEMORY BOARDS - \$80 EACH. STEVE CARTER, 227 RAILROAD AVENUE, RIFLE, CO 81650."

EXPANDER BLACK BOX PRINTER WITH COVER & BASE \$250
MICHAEL FRIDAY 4812 N 10ST 810 MCALLEN, TX 78501
(713) 687-7030

HELP

SIRS, I AM USING: 6800 SWTPC DOS68.51A SSB 8" DUAL DISK SYS CT64. IS THERE A PROGRAM AVAILABLE FOR RTTY USING THE ABOVE EQUIP? ESPECIALLY INTERESTED IN THE PGM HAVING A "MAILBOX" FEATURE. THANK YOU
DUANE SPRINKEL 11765 OAKLAND YUCAIZA, CA 92399

DEAR SIR, WOULD LIKE TO SEE SOME SSB PROGRAMS IN THE MAGAZINE. DON'T SEEM TO BE ANYTHING BUT FLEX LATELY. THANK'S FOR YOUR HELP. H.C. FIELDS W5SGX

ED'S NOTE: SORRY WE DON'T GET MANY SSB. HOW ABOUT SOME! DMW

DO YOU KNOW OF ANYONE WHO IS WRITING AGRICULTURAL PROGRAMS FOR THE 6800 FLEX EXTENDED BASIC OPERATING SYSTEM? IF SO I WOULD LIKE TO KNOW HOW TO GET IN TOUCH WITH THEM. MERLE BERTSCH RT. 1 BOX 137 MILLER, S.O. 57362

DEAR MR. WILLIAMS: I NEED HELP IN LOCATING A DRIVER FOR A NEC SPINWRITER DUMB PRINTER, MODEL 5501, THAT WILL BE INTERFACED WITH A SMOKE SIGNAL BROADCASTING 6809 CHIEFTAIN COMPUTER (DUAL 5.25" DRIVES WITH THE DCB-4A CONTROLLER). CAN ANYONE HELP ME? THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION. RICHARD NORRIS 2231 BLAKE AVE. DAYTON, OHIO 45414 (513) 898-0314

DataChem, Inc.



New Complete Smart Graphics Terminal

80 characters 32 lines, 512 by 256 point or vector graphics
green CRT, keyboard, 75, 10.2K baud \$898.00

Surplus unused new equipment

Motorola 9in. Green phosphor CRT M2000-355	\$188.00
Centronics Printers	798.00
Cherry "Pro" Keyboards	120.00
8in. Disk Drive Cabinets	80.00
Shugart SAB50 soft or hard sectored	840.00
Power One CP208	
Diskettes	8in. SDDO \$28.80/10
	5-1/4in. DSDO 27.00/10

Check, money order C.O.D.

Inquiries invited.

138 West Carmel Drive, Carmel, IN 46032 • (317) 848-7542

Model EP-2A-88 EPROM Programmer

- ★ Easy to use
- ★ Reliable
- ★ Field proven



Fast as Jackrabbits . . . Well, almost!

In Australia, two rabbits can reproduce over 13 million offspring in three years. . . At 105 seconds for 2716's, the EP-2A-88 can reproduce 1,892,160 EPROMS in three years. Single push button control, the EP-2A-88 checks if EPROMS are erased, programs and verifies. Many features, including self test, diagnostics and audio prompt.

The EP-2A-88-1 will accept Copy (CM) modules for the 2758, and 2716 EPROMS. The EP-2A-88-2 will accept copy modules for the 2716, 2732 and TMS 2532 EPROMS. Power requirements are 115 VAC 50/60 Hertz at 15 watts.

Part No.	Description	Price
EP-2A-88-1	EPROM Programmer	\$490.00
EP-2A-88-2	EPROM Programmer	490.00
CM-50	Copy Module for 2716, TMS 2516 EPROMS	25.00
CM-70	Copy Module for 2758, TMS 2508 EPROMS	25.00
CM-20	Copy Module for 2732 EPROMS	25.00
CM-20-A	Copy Module for 2732A EPROMS	33.00
CM-40	Copy Module for TMS 2532 EPROMS	25.00
	Non Standard Voltage Option (Specify 220v, 240v, or 100v)	15.00

Optimal Technology, Inc.

Phone (804) 973-5482
Blue Wood 127 Earlysville, VA 22936

Color Computer SMALL C Compiler

- Generates assembly language source output
- Requires only 16K memory
- Extensive library functions in source code
- Supports most C functions
- Generates position independent code

Requires 16K, Disk System, Assembler
Price \$59.95

TERMS: Check, MC/Visa. California residents add 6%.
Foreign or C.O.D. add 15% for shipping and handling.

(714) 755-4373



DUGGER'S GROWING SYSTEMS

POST OFFICE BOX 305 SOLANA BEACH, CA 92075

ROM Packet Available Soon

STYLOGRAPH™ 6809 WORD PROCESSING SYSTEM

STYLOGRAPH 2.0

All of the convenience and features for which Stylograph is well known plus:

- True proportional printing on specialty printers.
- Files longer than memory.
- "Help" command to aid in learning.
- New menu driven, self prompting functions.
- Left and right scrolling for pages larger than screen.
- Embedded printer control commands allowed.
- Simplified method for underline, bold-face, superscript, etc.
- Supports NEC, Diablo, Qume, 737, and 739 printers.
- Can be user configured for virtually any terminal or printer.

\$295, manual \$15, updates from old versions \$180.

STYLOGRAPH 3.0

This version is designed for "tty" printers but is otherwise identical to version two. It does not support specialty characteristics such as superscript, subscript, incremental printing, and proportional printing.

\$195, manual \$15, updates from old versions \$90.

STYLOGRAPH MAIL MERGE

This program takes files of variables, such as names and addresses, and inserts them into a Stylograph text file for automated mail list generation. It will also allow a number of Stylograph text files to be appended at printout time so that page numbers and headings will be continuous in the printout.

\$125, manual \$10.

STYLOGRAPH SPELLING CHECKER

This is a valuable addition to any word processing application. It checks all words in a manuscript against an internal dictionary. The dictionary included has a vocabulary of over 20,000 words and is fully expandable. New words encountered in the text may be added to the dictionary making the creation of custom tailored and foreign language dictionaries a snap.

\$145, manual \$10.

When ordering specify operating system (FLEX™, Uniflex™) and disk size. VISA & MC accepted.

20% discount on 3 program order.



STYLO SYSTEMS

BOX 238 WILLIAMSVILLE, NY 14097

716-634-2466

SUPER SLEUTH

DISASSEMBLERS for 6800/1/6

-analyze (6800/1/5/68002) or (X-60,3080/5)

-easy-to-use, with extensive manual

-includes xref and name-changer

EACH \$88

CROSS-ASSEMBLERS

MACRO SETS for TSC 6809 ASSEMBLER

-generate code for 6800/1,6805,6502,X-60,6080/5

EACH \$90,ANY 3 \$100

DEBUGGING SIMULATORS

RUN on 6800/1/6

-easy-to-use, with extensive manual

-for 6805

-for 6502

EACH \$76



COMPUTER SYSTEMS CONSULTANTS

1454 Latta Lane Conyers, GA 30207

Telephone 404-483-1717/4570

For catalog or dealer information contact Bud Pass
Exclusive U. K. dealer is Compuserve in London

TABULA RASA

FULL-SCREEN ELECTRONIC

SPREADSHEET SYSTEM

-adder to DESKTOP/PLAN

(TM Desktop Computing)

\$100

6502 TRANSLATOR

-translates 6502 source to 6809 source

-easy-to-use, with comprehensive manual

\$75 (coming)



FULL-SCREEN DISPLAY

FOR XBASIC on 6809, uses terminals and video boards

-forms display generator 680

-assembler system (memory-driven, powerful) \$100

-inventory and manufacturing \$100

TSC BASIC UTILITIES

-xref and resequencer for BASIC, XBASIC, PC, XPC \$25

-sort-merge XPC program generator \$25

ONLY YOU CAN STOP SOFTWARE PIRACY!

All programs run under 6809 FLEX - some also run on 6800/1

CALL ABOUT UNIFLEX VERSIONS OF PROGRAMS

(UNIFLEX trademark Technical Systems Consultants)

All programs provided in source on disk - specify 5 1/4", density, sides

For VISA and MASTER CARD give account, exp. date, phone

U. S. funds only - add 5% (10% overseas) for shipping

Open P. O.'s for D & B rated clients only

I B M P A K

FLEX9™ USERS

BRIDGE the biggest GAP in your system

READ/WRITE/FORMAT IBM 3740 DISKS

No worries about ASCII - EBCDIC conversions or different directory and file organizations
IBMPAK IS THE ANSWER!

- Lists all or part of an IBM diskette
- Copies files from IBM diskettes to FLEX diskettes
- Formats diskettes to IBM standard
- Copies files from FLEX diskettes to IBM diskettes

With IBMPAK, your FLEX9 system can access virtually all IBM and IBM compatible systems equipped with 8 inch floppy disk drives

IBMPAK opens a new world of data for you.

CROSS THE BRIDGE BETWEEN YOUR MICRO AND THEIR MAINFRAME

IBMPAK \$125.00
(For SWTPC DMAP1 or DMAP2)
Documentation Only \$15.00
Dealer Inquiries Invited



VISA/MASTER CARD PHONE ORDERS
BETWEEN 1-5 PM CST
TECHNICAL CALLS - 8-9 PM CST
512/441-6568



HELIX ENTERPRISES

504 FORT DRUM DRIVE
AUSTIN, TEXAS 78745

Terms:
Check or
Money Order

*FLEX - Technical Systems Consultants, Inc.
IBM - International Business Machines
SWTPC - Southwest Technical Products Corporation

68 MICRO JOURNAL PROGRAMS - DISK

Disk-1: FILESORT, MINICAT, MINICOPY, MINIFMS,
**LIFETIME, **POETRY, **FOODLIST, **DIET.

Disk-2: DISKEDIT, PRIME, *PRMO, **SNOOPY,
**FOOTBALL, **HEXPAN, **LIFETIME, Instr.,
DISKEDIT.REP (patches).

Disk-3: CBUG09, SEC1, SEC2, FIND, TABLE2,
INTEXT, DISK-EXP, *DISKSAVE.

Disk-4: MAILING PROGRAM, *FINDDAT, *CHANGE,
*TESTDISK.

Disk-5: *DISKFIX 1, *DISKFIX 2, **LETTER,
**LOVESIGN, **BLACKJACK, **BOWLING.

NOTE: All are as published or received by 68
Micro Journal, some have fixes and patches.

This is a reader service only! No Warranty is
offered or implied, they are as received and are
for reader convenience ONLY. Also 6800 and 6809
programs are mixed, as each is fairly simple
(mostly) to convert to the other.

PRICE: 8" Disk \$19.95 - 5" Disk \$17.95

68 MICRO JOURNAL
POB 794
Hixson, TN 37343
615-842-4600

* Indicates 6800, ** Indicates BASIC SWTPC or
TSC - 6809 no indicator.

MASTER CARD - VISA accepted - Foreign add
sufficient postage surface or air!!

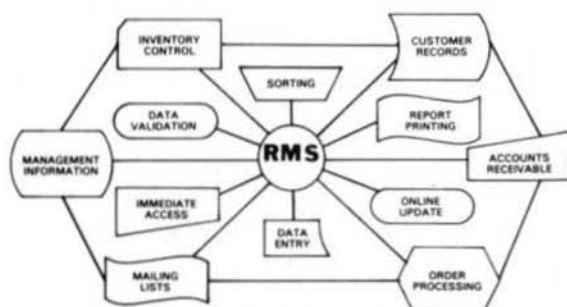
6809

RECORD MANAGEMENT SYSTEM

RMS

DATABASE MANAGEMENT

- USER DEFINED RECORD FORMAT VIA DATA DICTIONARY
- SCREEN ORIENTED, FORM FILL OUT TYPE OF ACCESS
- OPTIONAL TWO LEVEL RECORD HIERARCHY
- ALL FILES IN ASCII TEXT FORMAT, BASIC COMPATIBLE
- DIRECT ACCESS BY KEY FIELD, MULTIPLE INDEX FILES
- EXTENSIVE DOCUMENTATION, SAMPLE APPLICATION
- VERSATILE, PROFESSIONAL QUALITY REPORT WRITER
- BUILT-IN SORT/MERGE
- EASY TO USE



* FLEX and UNIFLEX are trademarks of Technical System Consultants Inc.; + OS-9 is a trademark of Microware

RMS is a complete DATABASE MANAGEMENT package for the 6809 computer. It is made up of five machine language programs that make up the most powerful business programming tool available for the 6809. It can be used by the relative novice, to implement an incredible variety of information storage and retrieval applications, without any programming. However, the programmer can use RMS as part of the solution to a larger problem, saving many hours of unnecessary program development time. RMS can be used to handle data input, editing, validation, on-line retrieval, sorting and printed reports. Custom data manipulation can be filled in by the user's BASIC programs.

SINGLE CPU LICENSE

FLEX*	\$200
OS-9+	\$250
UNIFLEX*	\$300

TERMS: ISA / MC / PREPAID

WASHINGTON COMPUTER SERVICES

3028 SILVERN LANE
BELLINGHAM, WA 98225
1 (206) 734-8248

In Australia & Southeast Asia, Available Through:
Paris Radio Electronics, 7A Burton St.
Darlington, NSW 2010 Sidney Australia

ACTION GAMES

The fastest growing producer of computer games for your 6809 has the products you have waited for!

NEW! ARCADE GAMES FOR THE COLOR COMPUTER CAVE HUNTER COLOR BERSERK

Fast paced action • Super Hi-Res Graphics
Dynamite sound effects • Runs in 16K of memory
These games will astonish you with their Detail and Quality.
They set a standard for others to follow.

— ADVENTURES —

Calixto Island • The Black Sanctum

Highly acclaimed by reviewers • Challenging situations
Fast, efficient machine language • Runs in 16K of memory
Save game in progress

Adventures on 5 1/4" TSC FLEX disc (specify 6800 or 6809)	each \$24.95
Both adventures on single disc	\$39.95
Adventures for color computer	\$49.95
Color Berserk for color computer	\$24.95
Cave Hunter for color computer	\$24.95

Shipped prepaid in continental U.S. California residents please add 9% tax



— MORE COMING SOON —

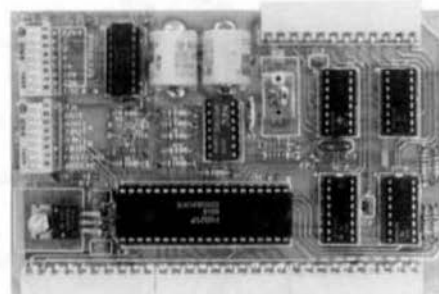


MARK DATA PRODUCTS

23802 Barquilla, Mission Viejo, CA 92691 • (714) 768-1551

TRS 80 IS A TRADEMARK OF TANDY CORP.

CALENDAR-CLOCK / TIMER / PARALLEL PORT



Calendar - Clock

CLK68-1

- Stores date and time whether across the computer or no
- 611 clock resolution software selectable
- On board battery (included) and charging circuit runs for months
- Day of week, month/year/year, hour/minute (12/24 hr)

Interval Timer

- For printer operation, multi-tasking, etc.
- Compatible with OS-9+ and VICE 2/3+
- 6809 runs faster with CLK68-1 than with timers such as INTPC HP-7
- Coarsest interrupt resolution time 340 microseconds to 270 sec.

Parallel I/O Port -- Fully buffered 8-bit parallel port

- DIP switches select input or output buffering (as jumper on the board)
- Compatible with parallel printer drivers in some versions of BASIC

Construction -- Fully assembled, tested, and boxed, a 16-pin connector

Manual -- Well documented - 36 pages

Dealer & OEM discount available

Assembled and tested	\$119.95	Kit	\$89.95
Goldplated bus conn	7.50	2 MHz option	2.50
Disk 5 or 8 in. 850 or Flex* OS-9 Available NOW			14.95

* OS-9 is a trademark of Microware Systems Corporation
Flex is a trademark of Technical Systems Consultants, Inc.

ROBERTSON ELECTRONICS
1003 Warm Sands Dr. SE
Albuquerque, NM 87123

Phone (505) 294-0025
NM residents add 4% tax
Add \$3 Shipping & Handling

COLOR COMPUTER SYSTEMS SOFTWARE

MODEM COMMUNICATIONS

Make your Color Computer an intelligent printing terminal with off-line storage! The Microtext module is just what you'll need for:

- Talking to a timeshare system or information service
- Printing out what is received as it is received
- Saving received text to cassette tape
- Re-displaying the received text even while on-line
- Communications with other computers
- Using your computer as a general-purpose 300-baud terminal
- Downloading programs from other computers

The Microtext module is a program pack containing not only firmware but a second serial port so that both your printer and modem can be connected at the same time. Microtext can be configured for any serial printer that will work with the Color Computer, even if it requires line feeds! But even if you don't have a printer, you can keep a permanent copy of your data by storing to cassette tape. Also, any Radio Shack/Centronics-compatible parallel printer may be used by adding the Micro Works' P180C parallel interface.

For those of you with special terminal applications, Microtext has selectable parity: it sends odd, even, mark or space. With mark parity (which is default) you can send to computers requiring either seven or eight bits. All 128 ASCII codes can be sent. Exchange programs with other Color Computer users! Basic programs may be downloaded from other computers or timesharing systems.

You'll find many uses for this versatile module! Available in ROMPACK, ready-to-use, for \$59.95.

EDITOR/ASSEMBLER

The Micro Works Software Development System (SDS80C) is a complete 6809 editor, assembler and monitor package contained in one Color Computer program pack! Vastly superior to RAM-based assemblers/editors, the SDS80C is non-volatile, meaning that if your application program bombs, it can't destroy your editor/assembler. Plus it leaves almost all of 16K or 32K RAM free for your program. Since all three programs, editor, assembler and monitor are co-resident, we eliminate tedious program loading when going back and forth from editing to assembly and debugging!

The powerful screen-oriented Editor features finds, changes, moves, copies and much more. All keys have convenient auto repeat (typematic), and since no line numbers are required, the full width of the screen may be used to generate well commented code.

The Assembler features all of the following: complete 6809 instruction set; complete 6800 set supported for cross-assembly; conditional assembly; local labels; assembly to cassette tape or to memory; listing to screen or printer; and mnemonic error codes instead of numbers.

The versatile ABUG monitor is a compact version of CBUG, tailored for debugging programs generated by the Assembler and Editor. It features examine/change of memory or registers, cassette load and save, breakpoints and more. SDS80C Price: \$89.95

MACHINE LANGUAGE

MONITOR TAPE: A cassette tape which allows you to directly access memory, I/O and registers with a formatted hex display. Great for machine language programming, debugging and learning. It can also send/receive RS232 at up to 9600 baud, including host system download/upload. 19 commands in all. Relocatable and reentrant. CBUG Tape Price: \$29.95

MONITOR ROM: The same program as above, supplied in 2716 EPROM. This allows you to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The EPROM plugs into the Extended Basic ROM Socket or the Romless Pak I. CBUG ROM Price: \$39.95

SOURCE GENERATOR: This package is a disassembler which runs on the color computer and generates your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. A 16K system is required for the use of this cassette. 80C Disassembler Price: \$49.95

LEARN 6809!

6809 ASSEMBLY LANGUAGE PROGRAMMING, by Lance Leventhal, contains the most comprehensive reference material available for programming your Color Computer. Price: \$16.95

HARDWARE

PARALLEL O!

USE A PARALLEL PRINTER with your Color Computer! Adaptor box plugs into the serial port and allows use of Centronics/Radio Shack-compatible printers with parallel interface. Assembled and tested. P180C Price: \$69.96

ROMLESS PAK I — is an empty program pack capable of holding two 2716 or 2732 EPROMs, allowing you up to 8K of program! The PC board inside comes with sockets installed, ready to go with the addition of your custom EPROMs. Price: \$24.95

SPARE PARTS — SAMs, 6809Es, RAMs, PIAs. Call for prices.

32K RAM!

MEMORY UPGRADE KITS: Consisting of 4116 200ns, integrated circuits, with instructions for installation. 4K-16K Kit Price: \$39.95. 16K-32K Kit (requires soldering experience) Price: \$39.95

GAMES

Pak Attack — Try your hand at this challenging game by Computerware, with fantastic graphics, sound and action! Cassette requires 16K. Price: \$24.95

Star Blaster — Blast your way through an asteroid field in this action-packed Hi-Res graphics game! Available in ROMPACK, requires 16K. Price: \$39.95

Berserk — Have fun zapping robots with this Hi-Res game by Mark Data Products. Cassette requires 16K. Price: \$24.95

Adventure — *Black Sanctuary* and *Calixto Island* by Mark Data Products. Each cassette requires 16K. Price: \$19.95 each.

THE MICRO
WORKS



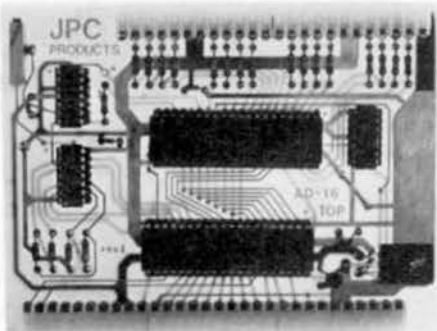
GOOD STUFF!

MasterCharge/Visa Accepted
California residents add 6% tax.

P.O. BOX 1110, DEL MAR, CA 92014 (714) 942-2400

JPC PRODUCTS FOR

6800 COMPUTERS



USES
ONE
I/O
SLOT

16 CHANNEL A/D BOARD

- 8 BIT DATA
- SOFTWARE CONTROLLED GAIN
- 3300 SAMPLES PER SECOND
- $\pm 0.7\%$ ACCURACY

COMPLETE KIT: AD-16 \$69.95

Terms: Cash, MC or Visa; Shipping & Handling \$3.00



Order Phone (505) 294-4623
P.O. Box 5615
Albuquerque, N.M. 87185

*OS9 Application Software

Specialty Electronics, Inc.

GENERAL LEDGER
with
CASH JOURNAL

The general ledger is the center of the Specialty Electronics Interactive Accounting System. With the package you can:

1. Produce balance sheets and income statements in various formats
2. Define account names, spacing, positioning, readings and subaccounts
3. Format special reports and print percentages
4. Post by hand, cash journal or by using the interactive accounts receivable, payable and payroll
5. Provide a clear audit trail for all entries
6. Input data in an easy to follow format
7. Use for multi company accounting without modification

General Ledger I-code \$399.00

ACCOUNTS RECEIVABLE

Your Accounts Receivable can be followed with a minimum of time investment using these features:

1. Regular invoicing, debit and credit memos, full and partial payments
2. Progressive billing and payments
3. Aging of periods specified by the user
4. New customers entered as needed
5. Statements are generated using individual invoices and overdue amounts totaled by aging category
6. Total interaction with the general ledger with tax, shipping, and travel expenses computed separately and posted to various accounts

Accounts Receivable \$299.00

INVENTORY

The Specialty Electronics Interactive Accounting System Inventory Control Package provides the tools to complete control of a large and active inventory, providing:

1. Reports for quantities on hand, quantities on order actively and many other categories
2. Complete item description, category group, supplier information, order dates, reorder quantities, etc.
3. Simple input and reconciliation procedures

Inventory Control I-code \$299.00

PAYROLL

with

ACCOUNTS PAYABLE

COMING SOON

COST ACCOUNTING

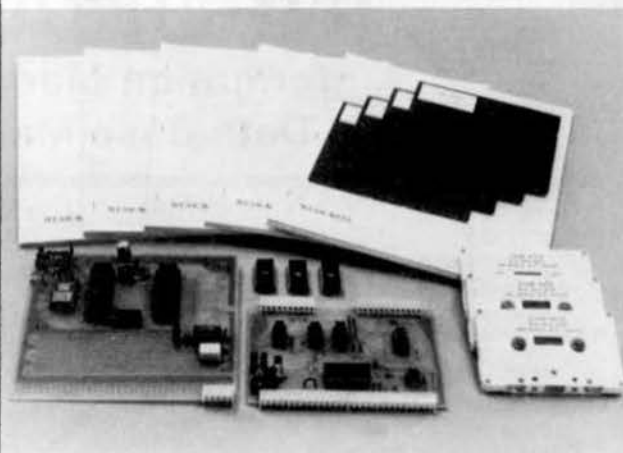
COMING SOON

Complete Documentation \$ 19.95

*OS9 and Basic09 are trademarks of Microware, Inc. and Motorola Corp.

(405) 233-1632 • P.O. Box 541 • 2110 W. Willow • Enid, OK, 73704

STAR-KITS



6800 HARDWARE

SBC-02 single board computer uses 6802 with RAM, ROM, I/O. Ideal controller, intelligent interface, and more. Printed circuit board is \$25, complete controller kit \$75, wired and tested \$150. Also available: **HUMB-BUG** (see below), Basic in ROM, etc.

CT-PS serial/parallel interface card. ACIA-type interface for RS-232C terminal and/or a parallel keyboard. Makes keyboard look like a terminal with absolutely no program patching. Ideal for video board based systems. Bare board \$20, complete kit \$55, wired \$100.

6800 AND 6809 FIRMWARE

6800 HUMB-BUG monitor. Totally MIKBUG compatible, plus single-stepping, multiple breakpoints, formatted memory dumps, multiple port control and more. "Fantastic!" say our customers. 2K version \$40 on 2708 or 2716 EPROM with source listing. Alternate versions, including video board versions available.

6809 HUMB-BUG-09 has all the features of 6800 HUMB-BUG and more. Not just a compatible monitor, but a debugging package and system I/O manager as well. Two ROMs, manual and full program listing for \$75. Also available in video board versions.

6800 AND 6809 SOFTWARE

BASIC UTILITY PACKAGE rennumbers, pretty-prints, prints variable and transfer indexes, compares, shortens Basic programs. On Percom or miniFlex* disk for \$30.

CHECK 'N TAX balances your checkbook, finds errors, prepares income tax data. On Percom, miniFlex*, Flex 2/0* or Flex 9* disk for \$40.

SORT-MERGE—the only one for Percom disk systems, sorts even full-disk files. \$35.

NEWTALK for your 6800 or 6809 system makes it talk to you. This memory dump utility outputs through a music board or any PIA port. \$30 on Percom or Flex 2/9 disk, or cassette.

6800 CROSS-ASSEMBLER written in Basic. Assemble 6800/6802 programs on your new 6809 (or your 370 at work!). Available on 5" disk, KC cassette, or TRS-80 Level II cassette for \$9.95.

GAME PACK with Eliza and 3-D Tic-Tac-Toe. 5" disk or KC cassette \$15.

Send s.a.s.e. for catalog. For detailed information, buy any manual for \$5 and get \$6 credit toward purchase. (*) is a trademark of Technical Systems Consultants.)

STAR-KITS, P.O. Box 209, Mt. Kisco NY 10549

INFOMAG - DBMS

Information Management by Groups

A versatile Data Base Manager for FLEX™ & UniFLEX™

- Data base may contain multiple master files
- Any master file can have multiple index or group files
- User configurable reports
- Reports may draw from one or two data bases
- Data base easily updated
- All operations recorded in an Audit Trail file for historical purposes

Inventory

Order Entry

Customer Lists

Demographic Data

Accounting

Mail List

Patient Records

Library Records

Geographic Data

Site Records

Payroll

Flex version for 6800 or 6809 with 8" disk

UniFLEX version allows multiple users on one data base

Written in TSC X BASIC

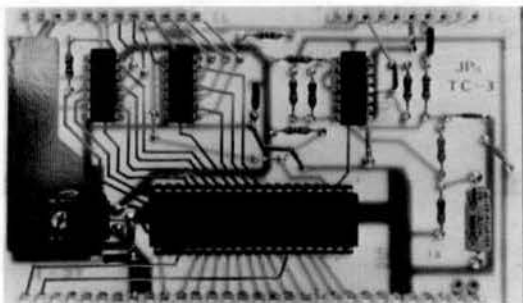
Uses Standard Record IO & Virtual Array Files

Great Plains Computer Company, Inc.
P.O. Box 916, Idaho Falls, ID 83402
(208) 529-3210 — Visa or Mastercard Welcome

FLEX & UniFLEX are trademarks of Technical Systems Consultants

JPC PRODUCTS FOR

6800 COMPUTERS



High Performance Cassette Interface

- **FAST** - 4800 Baud Loads 4K in 8 Seconds!
- **RELIABLE** - Error Rate Less Than 1 in 10⁹ Bytes
- **CONVENIENT** - Plugs Directly Into The SWTPC.
- **PLUS** - A Fully Buffered 8 Bit Output Port Provided.
- **LOW COST** - \$59.95 For Complete Kit.
- **OPTIONAL** - CFM/3 File Manager:

Manual & Listing \$19.95
(For Cassette Add) \$ 6.95

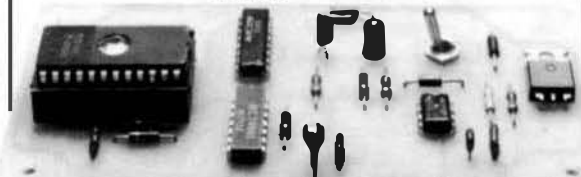
TERMS CASH, MC or VISA. Shipping & Handling \$1.00



Order Phone (505) 294-4823
P.O. Box 5615
Albuquerque, N.M. 87185

EPROM PROGRAMMER

Shown assembled. EPROM not included.



For single supply 2516, 2716 & 2758 EPROMs. Connects through a user supplied interface to any computer system. Interfacing requires two 8-bit ports plus hand-shake lines. One of the ports must be software controllable for input or output. Timing is done via hardware, thus is independent of MPU clock rate. Verify erased, Program — entire or partial. Auto verify after programming. Transfer contents to RAM for modifying or duplicating.

Select Documentation for:

6502

6800

6809

8080/8085/280

Interface to:

6820 P/A or 6522 V/A

6820 P/A

6820 P/A

8255 P/P

Comprehensive documentation booklet contains schematic, instructions for construction, check-out and use, and a well commented assembly listing for the specified MPU.

Complete kit of parts (includes ZIF socket)..... \$ 45.00

Bare PC board and Documentation..... \$ 25.00

Software listings for additional MPUs (with purchase of kit or PC board)..... \$ 5.00

Ordering: Specify MPU. Add 5% for P&H. Overseas add 10%. Airt. residents add 5% tax.



Micro Technical Products, Inc.

814 W. Keating Ave., Dept. J
Mesa, Arizona 85202 • 602-839-9902



ALFORD AND ASSOCIATES - GOOD NEWS!

PAGE ONE

ANNO DOMINI, NINETEEN HUNDRED EIGHTY-ONE

TUESDAY, DECEMBER 1st.

COLOR COMPUTER TALKS!

Alford & Associates is now shipping its SP-1 "SPEAKER PACK" for the Radio Shack Color Computer. The SP-1 plugs directly into the ROM-pack slot, and its use requires no wiring, computer modification or electronics knowledge!

The speakers provided gives your computer the power of speech using nothing more than Basic Peek and Poke statements! The SP-1 can add a new dimension to your games, business programs or CAD drills. Just about any application can benefit from the SP-1!

The SP-1 allows unlimited speech. Also, the SP-1 requires less memory overhead for speech than any other type of unlimited voice synthesizer on the market today. Typically, fewer bytes of storage are needed than the equivalent number of letters in English Text! Basic data statements suffice to store most any text you want! Also, no machine language routines are needed to drive it!

The SP-1 comes with sample software in Basic to demonstrate the power of this fantastic device. Alford's even supplies a version of their VOX-EDITOR to allow users who have 16K of memory to edit speech files quickly and easily (Extended Basic is NOT required!)

The SP-1 includes a comprehensive manual which provides speech theory, use of the included software, phoneme code charts, sample programs and much more!

COMPUTERS SPEAK TEXT!

Alford's has been on the lookout for a good speech converter program for use with their SP-1 and VS-1 speech synthesizers, and report having finally found it! The program takes English text in ASCII form, converts it, and then directly drives the synthesizer! By sending the appropriate control codes, you can cross switch between text conversion or speaking letters or speaking straight phoneme information!

The standard version is designed to work just like OUTCH or OUTKK. In all codes, you call the converter with characters in the A-Z-0-9-SPACE. In conversion mode, characters are accumulated until a word is complete, then it is converted and spoken. In letter mode each character is treated as an ASCII character and pronounced. In phoneme mode, each character is treated as a single inflected phoneme code.

The Color Computer version is even easier to use. Once loaded, Basic has a new verb - SAY. To use the converter, you simply use the command to make the computer talk: i.e., SAY "THIS IS A COMPUTER SPEECH TEST", and the Color Computer will!

Most people don't realize it, but the total national debt in this country is just over one trillion dollars. Today's economists tell us that this is why we have inflation. What they don't tell you is that the total debt in the private sector is over nine trillion dollars! The reason the private sector is so large is that it is not subject to the same controls as the public sector.

TREK-69, COLOR-TREK

Ever since Alford's introduced TREK-68 last year, we've been asked them to do a version for 8800 users and for the new TREK-80 Color Computer. They said that they could have, but their old home-brew computer and a bright shiny store-bought one might not have been compatible. Rather than take a chance, they held off until they decided on which systems they wanted to buy. Well, they finally decided, and at last, our wishes have come true!

If you have a MEMORY-MAPPED DISPLAY then TREK-69 or TREK-80 are for you. If you have a color computer with 16K memory (Extended Basic not required), then you should ask for COLOR-TREK.

They took the classic trek-game and re-wrote it completely in assembly code, making it run in REAL-TIME. The result is, we feel, the finest TREK game available!

Enemy destroyers chase you even as you move about the quadrant. Their multiple battle plans make them hard to evade! You dodge torpedoes and return fire. Damage is sustained and repairs occur as you play. Messages flash on and off. Again, all in REAL TIME!

Game difficulty levels run from SIMPLE (for beginners) to a level which, to our knowledge, only one person other than the author himself has succeeded in winning! This is not a simple game. The best playing time recorded for the awful SUICIDE OPTION is twenty-nine minutes. The fastest loss we have seen occurred in only eleven seconds!

Have a MEMORY-MAPPED DISPLAY? Then all we can ask is, why haven't you TREK-ed yet!

SPEAKER BARE BOARDS!

Alford and Associates recently lowered the price on its VS-1 synthesizer. A company spokesman stated that the reduction was due to the great response that the 35-50 community has given the board. Now they are going one step further. You can now buy a bare board, manual, disk or synthesizer chip separately. See the price list for details.

Alford & Assoc.
P.O. Box 6743
Richmond, Va.
23230
804-320-6722

RICHMOND (AP). Today, 46 year old Harley R. Amundson was observed biting a mongrel dog in Monroe Park. When asked by this reporter what prompted such a singular activity, Harley replied that he had been coming to the park daily for fifteen years, and that on each and every outing, the dog had bitten him. Alford's would stand as a kind of

NEW SCREEN EDITOR!!

Does your terminal have an addressable cursor like the Scepter 10-120? Does your terminal scroll when you do a one line on the bottom line? Does your terminal run full duplex? If not, then you should read this ad. Otherwise, you may be ready for SCHEDITOR III!

How would you like an editor that will handle a 252-column spread sheet? Or one that allows you to move margins anywhere on the screen? Or one that handles true multi-column edit jobs like this page? Or that formats text as you type? Or that allows you to set or clear tabs at any time, anywhere, with a single key-stroke? SCHEDITOR III CAN!

Like to be able to define what single-key operations you do with what single keys? Or for that matter, what command names you want to give the commands? YOU CAN WITH SCHEDITOR III!

Wouldn't it be nice to be able to define up to twenty-six editing macros, with a macro length of up to 1000 characters? Or to be able to edit macros, operations and text, all in the same macro? Or even to display and edit the macros themselves just like text? Or have and load your macros from disk files? YOU CAN WITH SCHEDITOR III!

How about file handling. Could you like to edit unlimited-sized files? Or to be able to read selected lines out of one file into another? Or how about conditional processing reading to let you see the lines before inserting them? Or be able to write lines out to new files? Or to specify where to start reading or writing, and how much at a time, and how many times? YOU CAN WITH SCHEDITOR III!

Think about it. Thirty-two control-code operations. About fifty other commands, and the number is growing. Twelve justification commands alone! ONLY WITH THE ALFORD-SCHEDITOR III!

As if all of this, and much more than we have room for here, isn't enough, this new editor is available for FLEX 1.0, FLEX 2.0, FLEX-9, DOS-9 and OS-9! OS-9 versions to be available soon (maybe as you read this, even!).

In talking to John Alford, Proprietor of Alford and Associates, we were told that he is tired of writing editors. He indicates that he knows only two ways to stop: get out of the business, or write the ultimate editor. It doesn't appear that he is going out of business soon!

If this hasn't convinced you that you should be using SCHEDITOR III, then call or write for more details, or for the complete SCHEDITOR III spec sheet. Our only question is, why continue to edit, when you can SCHEDITOR?

SCHEDITOR III is available for most serial terminals, and all memory-mapped displays, 8800 and 6809 versions are ready now!

FOODY GUTTER, AR - This reporter was previously of the opinion that he had seen everything, but found that there is truly something new under the sun, as the honorable Senator Bilge Pump was caught in the very act of talking the truth to his constituents.

When queried about his common law wife, Senator Pump stated that he was

SSB DOS UTILITIES

As many of you know, Smoke Signal Broadcasting's DOS is one of the best around. There was, however, one thing we felt to be lacking...disk access!

Alford and Associates has finally found how to go about naming a disk in a non-destructive and secure way, and started to write some utilities using the disk information record. Their NAME utility allows you to name your disks. The information utilities include the disk name, serial number, creation date, last update date, a comment field, and last but not least, a disk file access code.

The access code led them to the second program, LOCK, with this program you can write, delete, and LIST LOCK your files!

With their LIST program, the list-locked files do not list unless you give the access code for the disk! In addition, you do not have to look at a pile of transient commands when you want to, as LIST allows you to option the listing for certain files, LIST even lets you list the disk information record!

The UPDATE program lets you change the information record! They also include PURGE to clean up disks, DUMP to make pretty core images, and TITLE to print title pages on all of your listings.

The UTILITIES-1 disk is available for DOS-9, versions 4.0 and up, and for all versions of DOS-9. The manual itself is a good reason for buying this package, as it has a batch or information on SSB disk structure.

PRICE LIST

SP-1 SPEAKER-PACK, COMPLETE . . .	\$170.95
SP-1 MANUAL ONLY	10.95
VS-1 SPEAKER, COMPLETE	\$160.95
VS-1 BARE BOARD ONLY	10.95
VS-1 MANUAL ONLY	10.95
VS-1 VOX-EDIT PROGRAM DISK ONLY . .	24.95
VS-1 MANUAL, BOARD, CHIP, DISK . .	109.95
VS-1 ASSEMBLED, LESS SC-01 . . .	129.95
SC-01A SYNTHESIZER CHIP	80.00
SC-1/6800 SPEECH TRANSLATOR . . .	\$25.95
SC-1/6809 SPEECH TRANSLATOR . . .	20.95
SC-1/COLOR SPEECH TRANSLATOR . .	10.95
TREK-69 DISK, MANUAL	\$24.95
TREK-69 DISK, MANUAL	24.95
COLOR-TREK CASSETTE, MANUAL . . .	14.95
MANUAL ONLY, ANY OF ABOVE . . .	9.95
SSB DOS UTILITIES #1 DISK	\$24.95
SCHEDITOR III/6809 DISK, MANUAL . .	\$89.95
SCHEDITOR III/6809 DISK, MANUAL . .	89.95
SCHEDITOR III/6809 DISK, MANUAL . .	24.95

PRICE OF MANUAL REFUNDABLE ON ANY ORDER. PRICES SUBJECT TO CHANGE WITHOUT NOTICE. BE SURE TO SPECIFY DISK SIZE, OPERATING SYSTEM AND PROCESSOR TYPE WHEN ORDERING.

THE LAST WORD...

This year (our third) has been the most successful ever. I would like to take an opportunity to thank our many fine customers for their support and understanding.

Most of all though, I would like to express my thanks to God, who is the major "Associate" in my business. At this time of year it seems especially appropriate to pause to give thanks and to remember the many articles which He has performed for all of us. Too often, we take His grace for granted.

In this season, we celebrate the miracle of the eternal light and the miracle of the birth of the Messiah. Both stand for hope for the human race. Both stand for God's light in our life. And both show His love for us, in that He provides for our needs in many ways, especially in times of darkness.

I pray that in this next year, my walk with Him will lead me closer to the place He wants me, and that I might become even better able to serve every one of you, my customers. I also hope that each one of you will pray for me and my family so that we might grow as He wants us to, and that we might be more worthy of your patronage.

Thank you again, in love and in prayer, from all of us, and especially from....

John A. Alford (proprietor)
Sally Anne Alford (most everything else)
Alford and Associates

GENERAL INFO

All of Alford's software is available on 5- or 8-inch disk except where noted. Also, except where noted, all software is available for FLEX 1.0, FLEX 2.0, FLEX-9, DOS-9 or OS-9. Versions for OS-9 are coming soon. Software orders are normally shipped within three days. Hardware runs from stock to 30 days.

You should add \$6 for shipping on any order under \$100. Alford's pays shipping over \$100. Overseas orders, add \$10 for air mail delivery. Virginia residents add 4% sales tax. Any order received without shipping or tax (where applicable) will be returned unopened. Unless you specify otherwise, shipping is by UPS in the U.S.

Alford's accepts Mastercard, Visa, COB's or checks in U.S. funds. Open account orders by prior arrangement only. Personal checks may delay shipping by two or three weeks.

FLEX is a trademark of Technical Systems Corporation. TREK-69 and Color Computer are trademarks of the Tandy Corporation. OS-9 is a trademark of Microware Systems Corporation.



Software piracy costs each of us. Most people don't realize that the reason that much of the available software costs what it does is simply because the writer has to increase the price of his product to make up for the lost sales which result from people who think they are doing a good deed for a friend. A relative is that

**DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?**

Don't Blame The Software!

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.



- ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; Integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket \$62.95
- ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); Integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank \$82.95
- SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression \$94.95
- ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets \$106.95
- SUPER ISOLATOR (ISO-11) similar to ISO-2 except double filtering & Suppression \$94.95
- CIRCUIT BREAKER, any model (add-CB) Add \$ 8.00
- CKT BRKR/SWITCH/PILOT (CBS) Add \$16.00

AT YOUR
DEALERS

Master-Card, Visa, American Express
Order Toll Free 1-800-225-4876
(except AK, HI, PR & Canada)

Electronic Specialists, Inc.

171 South Main Street, Natick, Mass. 01760
Technical & Non-800: 1-617-655-1532

MAGIC SPELL™

Now your 6800 or 6809 system can proof-read your text files and fix your spelling and typographical errors in just minutes.

MAGIC SPELL™ compares each word in your file against a dictionary, displays or prints every word not found, and lets you correct it on the spot. The result is an error-free text within minutes.

MAGIC SPELL™ is written for the non-technical user. It has several options, including listing to a terminal or printer, correcting or marking errors, adding new words to the dictionary, or generating a custom dictionary to fit your writing style. Although it comes with a complete manual which explains every option in plain language, MAGIC SPELL prompts for all the information it needs so even beginners can use it without constantly referring to the manual.

MAGIC SPELL™ is extremely fast and compact. It will run in systems as small as 16K, can correct documents up to ten times larger than available memory, and reads text at a rate of about ten pages per minute. MAGIC SPELL™ is in stock now for Technical Systems Consultants' MiniFlex, 6800 Flex, and 6809 Flex, as well as for Percom Disk systems. OS-9 and SSB versions will be available soon. It is available in two versions:

MAGIC SPELL I is for the general user. It comes with a 10,000 word dictionary, and costs \$89.29. This is the version we ourselves use.

MAGIC SPELL II is for the professional writer who demands the very best. It contains several speed enhancements, and features a 75,000 word dictionary. This version is available only for 6809 systems, and costs \$239.29.

STAR-KITS

P.O. Box 209
Mt. Kisco, New York 10549
(914) 241-0287

68000

Many of you have asked when we are going to introduce 68000-based products, and on which bus structure. We are pleased to announce our first modular unit for 68000 systems — a 128-kb memory board with **VERSABUS™** compatibility. This is one of a range of **VERSABUS**-compatible modules that we plan for 1982. We are also watching developments on the VME bus, and may offer products for that bus should sufficient demand develop.

- **VERSABUS** Plug-compatible
- 128-kb with Parity Generation and Checking
- Two 64-kb Blocks Addressable to any 64-k Boundary (in any combination of supervisor data/program or user data/program areas)
- LED STATUS LIGHTS indicate the following hardware conditions:
 - 4 - Power Supplies Functioning Properly
 - 2 - Memory Block Being Accessed
 - 1 - Address Parity Error
 - 1 - Data Parity Error
- Price — only \$2295



*VERSABUS is a Trademark of Motorola, Inc.

SMOKE SIGNAL BROADCASTING

31336 Via Colinas • Westlake Village, CA 91362
(213) 889-9340

-FLEX-UNIFLEX UTILITIES-

COMPUTERIZED DICTIONARY

- CHECK SPELLING IN ANY TEXT FILE
- AUTOMATIC CORRECTION OF MISSPELLED WORDS
- CORRECT MISSPELLED WORDS INTERACTIVELY, IN CONTEXT
- ADD WORDS TO DICTIONARY FILE WITH ONE KEYSTROKE

SCREEN DESIGN AID

- CREATE SCREENS INTERACTIVELY
- DEFINE CONSTANTS, INPUT, OUTPUT, AND UPDATE FIELDS
- GENERATE EXECUTABLE 'BASIC' PROGRAM
- CREATE DEMO PROGRAMS QUICKLY
- CHARACTER BY CHARACTER EDITING

DAVIDSON SOFTWARE SYSTEMS

P.O. BOX 21002 • LANSING, MICHIGAN 48909
PHONE: 517-332-5989

WRITE OR PHONE FOR FREE BROCHURE

ELEKTRA CABINET

Made of heavyweight 0.090" thick aluminum.
Interior Size: 18-1/2" wide by 21-7/8" deep x 6-3/4" high
Heavy duty A.C. line cord.
A.C. fuse holder
EMI filter

Fan with optional filter

Back panel has 10 cutouts for "D" type data connectors

Front panel has key on/off power switch, 2 illuminated push buttons (Reset and NM/Abort), and 2 cutouts for 5 1/4" floppy drives.

Without power supply:	\$250.00
With 110v power supply, disk regulator board or two filter plates:	\$450.00
With 220v power supply, disk regulator board or two filter plates:	\$500.00

POWER SUPPLY

Highest quality linear power supply conservatively rated at 15a @ 8v,
3a @ 16v, 3a @ -16v

3 primary inputs to adjust for light, medium, and heavy loading

110v version: \$175.00 220v version: \$225.00

DISK REGULATOR BOARD with cables

Powers 2 5 1/4" floppy drives: \$50

Filter (fan): \$10.00

ELEKTRA CPU 8/9

Choice of 6808 or 6809 CPU

(6808 is software compatible with the 6800 or the opcode level).

DEVICE	6809 ADDRESS	6808 ADDRESS
3 2716 Eprams		
Eprom #3	F800-FFFF	F800-FFFF and E000-E7FF
Eprom #2	F000-F7FF	F000-F7FF
Eprom #1	E800-EFFF	E800-EFFF

1K Static-load RAM	E400-E7FF	A400-A7FF and A000-A3FF
MC6840 Triple Timer	E210-E217	8200-82B7

MC14411 Baud Rate Generator producing baud rates of:

Low Range 110, 150, 300, 600, 1200, 4800, and 9600

High Range 440, 600, 1200, 2400, 4800, 19200, and 38400

The board does not contain a DAT and does not support extended addressing.

The board supports DMA by either HALT or BUSREQ when a 6809 CPU is used.

DMA to the devices on the CPU card is not supported.

The board will run any of the MKBUG™ compatible monitors in the 6808 mode and SBUG-E, MUMBUG (Special Version), and GMMBUG-09 in the 6809 mode. The ELEKTRA CPU 8/9 will run any of the GIMIX® disk controller boards with the appropriate GIMIX® version of FLEX™. A special version of OS-9™ L-1 is available.

Base board: \$50.00* Kit: \$225.00* Assembled: \$275.00

ELEKTRA DPS Dual Port Serial Card

Fits the standard 30 pin SS-50 bus I/O slot

Can be configured for 4 addresses per port with the B port 2 addresses higher than the A port or for 16 addresses per port with the B port 4 addresses higher than the A port.

Each port is terminated at two 16 pin dip sockets, one socket configured for modem and the other socket configured for terminal or printer. RTS, CTS, DTR, DCD, DSR are appropriately implemented.

Each port has independent selection of baud rate.

Each port allows the interrupt request to be jumpered to the IRQ or FRQ/NMI bus line.

Base board: \$20.00* Kit: \$60.00* Assembled: \$80.00

Assembled cable (two required for each interface board): \$20.00 each

ELEKTRA DPP Dual Port Parallel Card

Fits the standard 30 pin SS-50 bus I/O slot.

Can be configured for 4 addresses per port or 16 addresses per port (occupying the first four addresses of the I/O slot).

The direction of the TTL buffers can be controlled by either on board jumper connectors or by a signal from the peripherals.

The interrupt request lines for each port may be individually jumpered to the IRQ or FRQ/NMI bus line.

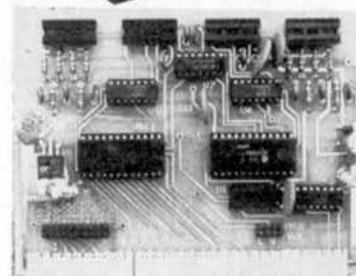
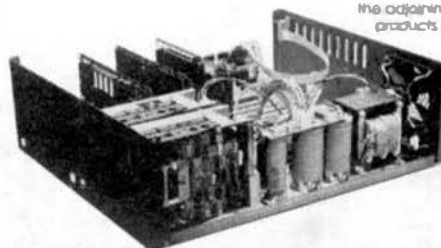
Base board: \$20.00* Kit: \$60.00* Assembled: \$80.00

Assembled cable (two required for each interface board): \$20.00 each

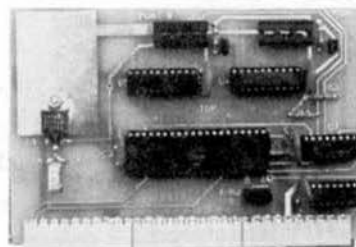
ELEKTRA COMPUTER PRODUCTS



The CPU, 56k memory board, and DMA controller board in the adjoining picture are products of GIMIX, Inc.



DPS Dual Port Serial



DPP Dual Port Parallel

*WARNING

AAA Chicago Computer Center does not provide repair or diagnostic service for customer assembled kits. AAA Chicago Computer Center does warranty and maintain service for our assembled boards. The customer should carefully take into consideration the small differential separating our kit and assembled prices when making his choice of purchase.

We have introduced our line of computer equipment with the purpose of offering the highest quality of components possible at affordable prices. For those of you whose needs dictate the state of the art in technology, we recommend the GIMIX line. When practical, our equipment is intended to be upward compatible to GIMIX equipment. We do not intend to offer a complete line of equipment and we recommend that you choose GIMIX components to round out your system.

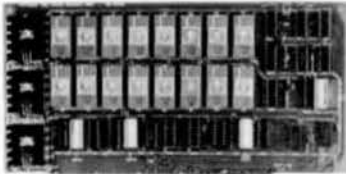
AAA Chicago Computer Center
120 Chestnut Lane • Wheeling, IL 60090 • (312) 459-0450

Phone consultation available most weekdays from 4 PM to 6 PM

DIGITAL RESEARCH COMPUTERS

(214) 271-3538

32K S-100 EPROM CARD NEW!



\$79.95
KIT

USES 2716's

Blank PC Board - \$34

ASSEMBLED & TESTED
ADD \$30

SPECIAL: 2716 EPROM's (450 NS) Are \$9.95 Ea. With Above Kit.

KIT FEATURES:

1. Uses +5V only 2716 (2Kx8) EPROM's.
2. Allows up to 32K of software on line!
3. IEEE S-100 Compatible
4. Addressable as two independent 16K blocks.
5. On memco extended or Northstar bank select.
6. On board wait state circuitry if needed.

7. Any or all EPROM locations can be disabled.
8. Double sided PC board, solder-masked, silk-screened.
9. Gold plated contact fingers.
10. Unselected EPROM's automatically powered down for low power.
11. Fully buffered and bypassed.
12. Easy and quick to assemble.

32K SS-50 RAM

\$259.95

KIT

For 2MHZ
Add \$10

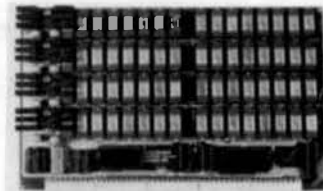
Blank PC Board
\$50

For SWTPC
6800 - 6809 Bus

Support IC's
and Caps
\$19.95

Complete Socket Set
\$21.00

Fully Assembled,
Tested, Burned In
Add \$30



At Least An affordable 32K Static RAM with full 6809 Capability.

FEATURES:

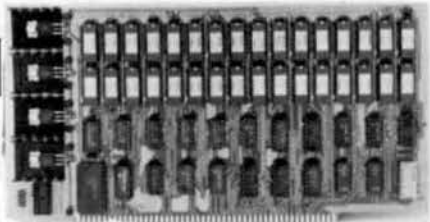
1. Uses proven low power 2114 Static RAM's.
2. Supports \$890C - EXTENDED ADDRESSING.
3. All parts and sockets included.
4. Dip Switch address select as a 32K block.
5. Extended addressing can be disabled.
6. Works with all existing 6800 6809 systems.
7. Fully bypassed. PC Board is double sided, plated thru, with silk screen.

16K STATIC RAM KIT-S 100 BUSS

PRICE CUT!

\$149.95
KIT

FOR 4MHZ
ADD \$10



KIT FEATURES:

1. Addressable as four separate 4K Blocks.
2. ON BOARD BANK SELECT circuitry (Cromemco Standard). Allows up to 512K on line!
3. Uses 2114 (450NS) 4K Static Ram's.
4. ON BOARD SELECTABLE WAIT STATES.
5. Double sided PC Board, with solder mask and silk screened layout. Gold plated contact fingers.
6. All address and data lines fully buffered.
7. Kit includes ALL parts and sockets.
8. PHANTOM is jumpered to PM 87.
9. LOW POWER: under 1.5 amps TYPICAL from the +5 Vdd Bus.
10. Blank PC Board can be populated as any multiple of 4K.

Blank PC Board W/DATA-\$33

LOW PROFILE SOCKET SET-\$12

SUPPORT IC'S & CAPS-\$19.95

ASSEMBLED & TESTED-ADD \$35

**OUR #1 SELLING
RAM BOARD!**

16K STATIC RAM SS-50 BUSS

PRICE CUT!

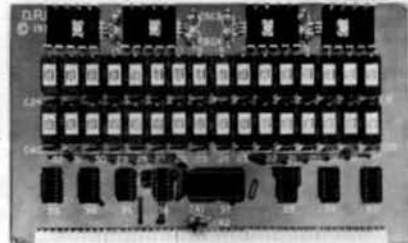
\$139.95
KIT

FULLY STATIC!

FOR 2MHZ
ADD \$10

FOR SWTPC
6800 BUSS!

ASSEMBLED AND
TESTED - \$35



KIT FEATURES:

1. Addressable on 16K Boundaries.
2. Uses 2114 Static Ram
3. Fully Bypassed
4. Double sided PC Board. Solder mask and silk screened layout.
5. All Parts and Sockets included
6. Low Power: Under 1.5 Amps Typical

Blank PC Board--\$35

COMPLETE SOCKET SET--\$12

SUPPORT IC'S AND CAPS--\$19.95

NEW! STEREO! S-100 SOUND COMPUTER BOARD

At least, an S-100 Board that unleashes the full power of two unbreakable General Instruments AY-3-8910 NMOS computer sound IC's. Allows you under total computer control to generate an infinite number of special sound effects for games or any other program. Sounds can be called in BASIC, ASSEMBLY LANGUAGE, etc.

KIT FEATURES:

- TWO GI SOUND COMPUTER IC'S
- FOUR PARALLEL I/O PORTS ON BOARD.
- USES ON BOARD AUDIO AMPS OR YOUR STEREO.
- ON BOARD PHOTO TYPING AREA.
- ALL SOCKETS, PARTS AND HARDWARE / IE INCLUDED.
- PC BOARD IS SOLDERMASKED, SILK SCREENED, WITH GOLD CONTACTS.
- EASY, QUICK, AND FUN TO BUILD. WITH FULL INSTRUCTIONS.
- USES PROGRAMMED I/O FOR MAXIMUM SYSTEM FLEXIBILITY.

Both Basic and Assembly Language Programming examples are included.

SOFTWARE:

SCL™ is now available! Our Sound Command Language makes writing Sound Effects programs a SNAP! SCL™ also includes routines for Register-Examine-Modify, Memory-Examine-Modify, and Play-Memory. SCL™ is available on CP/M* compatible diskette or 2708 or 2716 Diskette - \$24.95 2708 - \$19.95 2716 - \$29.95. Diskette includes the source. EPROM'S are ORG at E000H. (Diskette is 8 inch Soft Sealed)

COMPLETE KIT!

\$84.95

(WITH DATA MANUAL)

Blank PC
Board W/DATA
\$31

SPECIAL PURCHASE!

UART SALE!

TR1602B — SAME AS TMS6011,
AY5-1013, ETC. 40 PIN DIP

TR1602B

\$2.95
EACH

4 For \$10.00

CRT CONTROLLER CHIP

SMC #CRT 5037, PROGRAMMABLE FOR 80 x 24. ETC. VERY RARE
SURPLUS FIND. WITH PIN OUT. \$12.95 EACH.

NEW! G.I. COMPUTER SOUND CHIP

AY3-8910. As featured in July, 1979 BYTE! A tentatively powerful Sound & Music Generator. Perfect for use with any 8 Bit Microprocessor. Contains: 3 Tone Channels, Noise Generator, 3 Channels of Amplitude Control, 16 bit Envelope Period Control, 2-8 Bit Parallel I/O, 3 D to A Converters, plus much more! All in one 40 Pin DIP. Super easy interface to the S-100 or other buses. **\$11.95**

SPECIAL OFFER: ~~\$44.95~~ each Add \$3 for 80 page Data Manual.

TERMS: Add \$2.00 postage. We pay balance. Orders under \$15 add 75¢ handling. No C.O.D. We accept Visa and MasterCard. Tex. Res. add 5% Tax. Foreign orders (except Canada) add 20% P & H. Orders over \$50. add 85¢ for insurance.

Digital Research Computers

(OF TEXAS)
P.O. BOX 401565 • GARLAND, TEXAS 75040 • (214) 271-3538

*TRADEMARK OF DIGITAL RESEARCH.

WE ARE NOT ASSOCIATED WITH DIGITAL RESEARCH OF CALIFORNIA, THE SUPPLIERS OF CPM SOFTWARE.

ALL SALES ARE MADE SUBJECT TO THE TERMS OF OUR 90 DAY LIMITED WARRANTY. A COPY OF THIS WARRANTY IS AVAILABLE FREE, ON REQUEST.

SOFTWARE SYSTEMS AND SOLUTIONS FROM SD

Software Dynamics has been offering quality software for 68xx class machines since 1977. We recognize that our customer's needs grow, and design our software to provide a growth path. SD offers compatible single-user, multi-user, and (soon) network systems to meet this need. Programs that run on the single-user system run unmodified on the multi-user and network systems. A virtual terminal driver assures that screen-oriented applications run on any CRT.

The BASIC compiler is the result of 10 years experience in building BASIC interpreters and compilers. Sequential, random and indexed files are supported, along with true BCD numbers to eliminate conversion errors. Long variable names, blocks for structured programming, and true multi-parameter subroutines and string functions aid program construction and maintenance. Compiled programs are both small and very fast, and the source is completely protected.

SD also offers word processing and accounting software built to the same high standards as its system software.

SDOS™

- Interrupt-driven DOS
- Read-ahead on sequential files
- LRU buffering optimizes random files
- Byte-addressable, device independent files
- Virtual terminal driver handles any CRT
- Command files
- Keyboard typeahead
- Disk file structure validation program
- Adaptable to any 68xx micro with 40kb or more
- Any combination of floppies or hard disk

SDOS/MT™

- Multi-user version of SDOS
- 1 to 8 users
- User space to 60 kilobytes
- Any hardware mapping technology

Structured Design BASIC V1.4

- 32 character variable names
- Line labels
- Parameterized, multi-line functions and subroutines
- Full access to SDOS sequential and random file facilities
- Multi-key indexed file option
- Print using with floating dollar sign
- 10 digit fast decimal floating point (no conversion errors!)
- Binary integer arithmetic
- IF-THEN-ELSE, WHILE-DO, ON ERROR DO
- Many other block structure facilities
- COMMON and program chaining
- Super fast execution
- Very compact compiled code
- Complete error trapping

SDOS is available for the following hardware:

Midwest Scientific Instruments 6800
Pace Technology 480
WaveMate Series 2000
Omnibyte 800, 890
Brittania Computing Models 242, 363, 484, 1010
Motorola Exorcisor™

BASIC 1.3, ASM and EDIT are available for 6800 FLEX™, SSB DOS or MDOS™.
SD also offers both 5¼" and 8" Winchester disk drives for Exorcisor systems.

Write for free catalog.

SEDIT

- What-you-see-is-what-you-get editor
- Uses cursor and arrow keys for positioning
- Insert by typing at cursor location
- Delete by RUBOUT at cursor location
- Edit any size file
- Cut and paste to move text
- Automatic margin wrap
- Tabs
- Very easy to learn

TYPE

- Word or document processing
- Letter and envelope generation
- Form letters with mailing lists
- Complete margin justification
- Centering and underscoring
- Table of contents generation

COUNT/UP

- Full accounting package
- General Ledger, Accounts Receivable, Accounts Payable
- User specifies all report formats
- Account structure and formats changeable at any time

Other programs:

SORT	Sorts records according to any combination of key fields
EDIT	Powerful context editor
IDB	ROMable debugger with single step capabilities
MEMTEST	Thorough memory diagnostic
ASM	6800/6809 assemblers
CHES	For lighter moments

SD is a registered trademark of Software Dynamics.
SDOS and SDNET are trademarks of Software Dynamics.
FLEX is a trademark of Technical Systems Consultants.
MDOS and EXORCISOR are trademarks of Motorola, Inc.



SOFTWARE DYNAMICS

2111 W. Crescent, Suite G ▲ Anaheim, CA 92801 ▲ (714) 635-4760

SALE — SALE — SALE
ON HAND NOW, 80 PCS.
SPECIAL BUY!

EPSON MX-70 PRINTER

80 char/sec, adjustable 4 to 10 inch pin feed.
 5 x 7 dot matrix, 96 ASCII char. set, parallel
 interface, one line buffer, 10CPI or 5CPI
 (software select), takes 3 part paper, size =
 4.3 x 14 x 7 inches, 12 lbs., full factory war-
 ranty.

POST PAID \$375.00
 NO COD's

**HHH STANDARD SYNTAX
 GRAPHICS**

Same syntax for all supported devices!
 Your graphics programs will run on other
 peoples systems, regardless of the device.
 (Assuming standard syntax driver for same).
 Source, Doc and object on disk. OS9 Mod-
 ules for:

Hazelwood VC-256
 255 x 250 \$25.00

Watanabe 'Digi-Plot'
 2000 x 3000 \$25.00

These are on hand, specify 5 or 8 inch disk.
 Modules for Gimix Video board, Hi-Plot and
 others are in the works. Special while they
 last, 1 VC-256 board with OS9 diskette —
 \$325.

We sell and support:

GIMIX
SMOKE SIGNAL BROADCASTING
SOUTHWEST TECHNICAL

We also know how to mix and match brands
 for your best performance to dollar ratio
WE PUT IT ALL TOGETHER!

H H H ENTERPRISES
P.O. BOX 493
LARUEL, MD. 20810
301-953-1155

MasterCharge VISA

****OS9 is a trademark of Microware
 Systems Corp. and Motorola Inc.****

'68' MICRO JOURNAL

- ★ The only ALL 6800 Computer Magazine.
- ★ More 6800 material than all the others com-
 bined: **MAGAZINE COMPARISON**

(2 years)

Monthly Averages

KB	BYTE	6800 Articles		TOTAL PAGES
		CC	DOBB'S	
7.8	6.4	2.7	2.2	19.1 ea. mo.

Average cost for all four each month: \$5.88
 (Based on advertised 1-year subscription price)

'68' cost per month: \$1.21

That's Right! Much, Much More

for About

1/5 the Cost!

OK, PLEASE ENTER MY SUBSCRIPTION

Bill My: Master Charge ☐ — VISA ☐

Card # _____ Exp. Date _____

For ☐ 1-Year ☐ 2 Years ☐ 3 Years

Enclosed: \$ _____

Name _____

Street _____

City _____ State _____ Zip _____

My Computer Is: _____

68 Micro Journal
 5900 Cassandra Smith Rd.
 Hixson, TN 37343

SUBSCRIPTION RATES

USA

1 Year \$24.50, 2 Year \$42.50, 3 Year \$64.50

*FOREIGN SURFACE Add \$12.00 per Year to USA Price

*FOREIGN AIRMAIL Add \$36.00 per Year to USA Price

**CANADA & MEXICO Add \$5.50 per Year to USA Price
 Cash (USA) or drawn on a USA Bank!!!



LUCIDATA PASCAL

If YOU need an easy-to-use, well proven implementation of Pascal, that doesn't need a mini computer to run it....
LOOK NO FURTHER - WE SELL IT!

- ☐ ONLY requires 16K-8K RAM plus one 5" disk drive
- ☐ all standard Pascal types are supported and full type-checking is performed
- ☐ REALLY fast 9-digit precision scientific functions
- ☐ Optional allocation of variables to absolute memory locations allows easy control of memory-mapped peripherals (eg video boards, PIA's ACIA's etc)
- ☐ Fully optimised run-time systems for 6800 and 6809
- ☐ Any number of EXTERNAL user supplied routines may be easily linked to Pascal defined function and procedure identifiers within your program
- ☐ Fast, easy-to-use compiler generates ultra efficient position independent and relocatable P-code instructions
- ☐ Multiple files - may be sequential/random disk files supported by your DOS, or physical devices added by your Scalar I/O to READ and WRITE your own SCALAR TYPES
- ☐ Custom versions available to special requirements
- ☐ All LUCIDATA Pascals are supplied with a comprehensive User Manual PLUS lots of demo programs and are fully supported by our Update Service

6800 FLEX 2 version on 5" disk \$150, on 8" disk \$165
6809 FLEX 9 version on 5" disk \$190, on 8" disk \$205
User Manual separately \$25 (deductable from purchase)
Prices include Airmail postage ANYWHERE in the WORLD!
Payment by Mastercard/VISA or certified cheque
Despatched by return of post (UK → Fast Coast 5 days)

Lucidata

LUCIDATA Ltd., P.O. Box 128
Cambridge, CB2 5EZ, ENGLAND
Telephone Orders (0223) 841906

Purveyors of Pascal since 1979

LUCIDATA Pascal is also available for Heath HDOS from POLYBYTES, 325 19th Street SE., Cedar Rapids, IA 52403
& Smoke Signal Broadcasting DOS68D from WINDRUSH Micro Designs, Gaymers Way, North Walsham, NR28 0AN, ENGLAND

TEXAS COMPUTER

TG-1 BIT RATE GENERATOR

- Supplies 9 standard bit rates from 19.2k to 110 simultaneously, which is not possible with any circuit using a MC14411 chip
- Uses no parts from your present system
- Requires no additional upgrade parts for MPA or MPA-2 boards
- Facilitates upgrading to 5550C status
- Gold plated connectors are standard on all TEXAS COMPUTER products
- COMPLETE AND TESTED WITH DOCUMENTATION \$49.00

OPB DUAL PORT SERIAL BOARD

- Compatible with both 5530 & 5530-C
- Full RTS, DCD, CTS etc. jumper control
- Top mount baud rate switches for easy access
- Two DB25 connectors for easy hookup
- Easily modified for separate xmit/rcv clocks
- COMPLETE AND TESTED WITH DOCUMENTATION \$69.00

add for shipping \$3.00

P.O. BOX 120818 ARLINGTON, TX 76012

VISA/MC

817-275-1848

HAZELWOOD COMPUTER SYSTEMS

DM-64 64K 2MHZ Memory Board

All Boards
Tested at 2.5 MHZ

The DM-64 is a 64K dynamic memory board which operates at 2 megahertz with fully transparent refresh. This is accomplished with a proprietary memory control design unlike any other. The board appears to the bus as a 64K static memory. All addressing options are made by DIP switch selection. This board sets the pace in state-of-the-art memory design and is backed by a ONE YEAR FACTORY WARRANTY.

COMPARE THESE FEATURES!

- Fully Transparent Refresh
- Conforms to ALL bus timing and loading
- Full 20 bit addressing
- SS-50 or SS-50C operation
- 6809 compatible
- Individual disable on each 4K segment
- Each board exhaustively tested and burned-in
- Low power consumption
- Gold bus connectors
- Fully socketed
- Industrial Quality Components and Construction
- Full 2 MHZ operation

ASSEMBLED, TESTED AND BURNED-IN \$495.00

**WHERE QUALITY
COMES FIRST**

ORDER # DM-64

SHIPPED POST PAID WITHIN CONTINENTAL U S

Coming Soon . . .

- 5 MB 5 1/4" Winchester Disk Drive and Controller
- High Resolution Color Graphics Controller
- IEEE 488 Bus Interface
- Intelligent (Programmable) I/O Controller
- ANSI MUMPS Interpreter (Multiuser)

HAZELWOOD COMPUTER SYSTEMS

7413 N. Lindbergh, Hazelwood, Missouri 63042, (314) 837-3466

Master Charge Visa American Express Diners Club

Dealer Inquiries Invited

F&D Associates
1210 Todd Road
New Plymouth, Ohio
45654
 614 - 592 5721

S-50 BUS

Send for free Catalog
 Visa ~ Master Charge ~ C.O.D.

FIFTH ANNIVERSARY SALE

We've been in business since March of '77

In appreciation, we're lowering prices on selected boards during March and April. You must mention this ad.

The TimeMinder - A 30 pin I/O card based on the OKI MSM5382, it keeps track of seconds, minutes, hours, day of week, day of month, month, year, and even allows for February 29th. On-board battery backup and recharging circuit. Solid state buzzer. Board can generate interrupts. Comes with assembly and checkout instructions and software assembly listing. A diskette is available separately for FLEX (tm)* systems.

TMB-1 Bare Board and Documentation reg \$35.00
 March and April only \$27.50

CPU-2 - A S50 bus central processor. Uses 6802. Has baud rate generator, ACIA serial port (current loop and RS232), Scratch pad memory, 2 parallel ports, EPROM socket. Use with AD209 for 6809 systems.

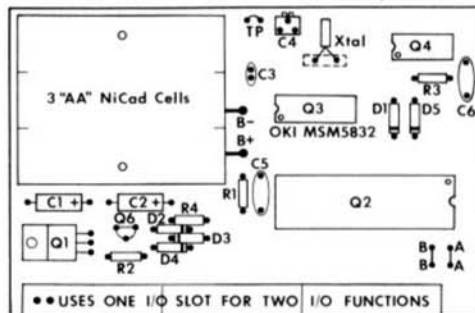
CPU-2 Bare Board and Documentation reg \$35.00
 March and April only \$30.00

AD209 6809 adapter board for CPU-2 reg \$15.00
 March and April with CPU-2 purchase \$ 7.50

Add \$3 s/h per order. Ohio res add 5 percent

*FLEX is a trademark of Technical Systems Consultants

Model 6800CL4 CalClock/TIMER



IT'S A HARDWARE CALENDAR/CLOCK

- Keeps date and time without servicing by the computer
- Day-of-week, month/day/year, hour:min:sec (12/24hr. + auto Leap Year)
- Hands off setting/control/access of ALL functions via software
- On-card battery and charging circuit keeps time for months, power off

WITH AN INTERVAL TIMER INCLUDED

- For (TSC/Flex2/9 Compatible) printer spooling, multi-tasking, etc.

Fully assembled & tested* \$99.95 5" Disk (Flex2/9 Flex9/9) \$10.00
 Complete kit* \$69.95 Goldplated buss connectors \$ 6.00
 Bare board* \$35.00 Shipping & handling \$ 3.00

* FULLY DOCUMENTED: instructions; diagrams; theory; more than 20 pages of sample software (automatically puts date in Flex2/9 date buffer, adds time-of-day to assembly listings, maintains constant, current time+date display on top line of CRT). Batteries not included. All IC's socketed.

© FLEX is the registered trademark of Technical Systems Consultants, Inc.



COMPUWARE Corporation
 P.O. Box 2710
 Cherry Hill, NJ 08003
 609-428-2309

Dealer and Volume Discounts Available

New Jersey buyers: ADD 5%
 Terms: CASH; MC; or Visa
 Flex9/9 Flex2/9 (default) □

SOFTWARE FOR THE HARDWARE

---> tFORTH -- AN EXPANSION AND EXTENSION OF RAY TALBOT'S ORIGINAL 6809 FIG-FORTH

tFORTH: available under FLEX or as a standalone, self-contained operating system. It can read or write FLEX files or standard FORTH screens so can interchange with other standard FORTH systems.

---> NOW AVAILABLE FOR EXORCISER compatible Creative Micro Systems' 9670 10 Mbyte Winchester

---> TEXTBOOK AVAILABLE!! "STARTING FORTH" 348 pp. Introduction to the language. Paperback \$16.00, hardback \$20. Foreign air add \$5.00.

---> FORTH - A TOOL FOR CRAFTSMEN! It has been said that if Chippendale had made programs he would have used FORTH as his tool. If you want to learn how to program, use a teaching language -- PASCAL or BASIC. If you know how to program, use a language designed for craftsmen -- FORTH. FORTH applications have spanned a wide range of tasks -- instrument control, data acquisition and analysis, process control, and interactive systems. Users of FORTH report productivity gains of 2 to 10 over other development tools. firmFORTH (tm) is for the programmer who needs to squeeze the most into roms.

(tm) tFORTH and firmFORTH are trademarks of Talbot Microsystems. (tm) FLEX is trademark of Technical Systems Consultants, Inc.

©tFORTH and firmFORTH are trademarks of Talbot Microsystems.

©FLEX is a trademark of Technical Systems Consultants, Inc.

tFORTH™ THE PROFESSIONAL'S CHOICE from the author of 6809 fig-FORTH TALBOT MICROSYSTEMS

---> tFORTH SYSTEM AND APPLICATIONS:

For all FLEX systems: GIMIX, SWTP, SSB, or EXORCISOR; or convert to other systems. Specify 5 or 8 inch diskette and 6800 or 6809. For standalone versions, write.

Manuals available separately - price in ().
 Add \$5/system for shipping, \$12 for foreign air.

** tFORTH - extended fig FORTH (1 disk) \$100 (\$15)

** tFORTH+ - extended more! (3 5" or 2 8" disks) \$250 (\$25)
 tFORTH+ includes 2nd screen editor, assembler, extended data types and utility vocabularies. GOING FORTH CAI course on FORTH, games, and debugging aids.

** TRS-80 COLORFORTH - available from The Micro Works

---> APPLICATIONS PROGRAMS:

** firmFORTH - 6809 only. \$350 (\$10)
 For target compilations to rommable code. Automatically deletes unused code and unneeded dictionary information. Includes full source code for target compiler and essential FORTH nucleus. Requires but does not include tFORTH+.

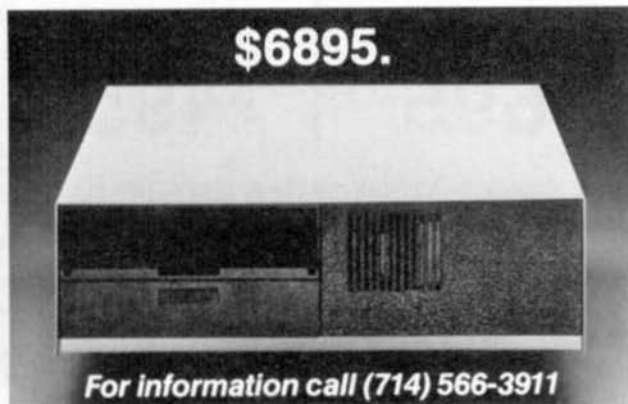
** TINY PASCAL compiler in FORTH. 6800/09 \$75 (\$20)

1927 Curtis Ave., Redondo Beach, CA 90278 (213) 376 9941

10 Megabyte Winchester Hard Disk System runs MDOS on Motorola Exorciser System.

☐ No modification to MDOS required ☐ MDOS based software stays alive ☐ All user software operates without modification ☐ Optional SA-801R flexible diskette drive system.

CSA Computer System Associates
7562 Trade Street, San Diego, CA 92121



NEW PRODUCT 12 BIT A/D

- HIGH QUALITY Boards for the SS50/C Bus Computer
- META LAB solves your toughest interface problems
 - DATA ACQUISITION and Process Control Specialists since 1974
 - ONE YEAR Factory Warranty

ADC1200

- HIGH SPEED 12 Bit A/D Board
- 16 CHANNELS Single-ended or Eight Channels Differential Input
- 25µsec Conversion Time
- 80K Samples Per Second in Single Channel Burst Mode
- Instrumentation amplifier/Selectable Gain
- Contained on Single 30 Pin Board
- Configurable in a Variety of Computer Controlled Modes
- SOFTWARE APPLICATIONS and Support

WRITE TODAY FOR COMPLETE DATA
On the ADC1200 and other Products

META LAB

Suite 106 2888 Bluff St. Box 1559
Boulder, CO 80505 303-440-4235

COMING SOON:

Z80 Soft Board IEEE488 Controller
8 Bit A/D & D/A Dual 12 Bit D/A

POWERFUL COLOR GRAPHICS

Uses the new TMS9918A Video Display Processor
High resolution 256 x 192 pixel display with fifteen colors
16k Bytes of onboard dynamic 150nS RAM included
32 graphic images can be individually moved with single X-Y command for smooth animation
External video input allows subtitling

SOUND EFFECTS AND MUSIC

Three AY3-8910 Programmable Sound Generators
Nine simultaneous voices
Three independent noise sources
Onboard stereo amplifiers drive two speakers

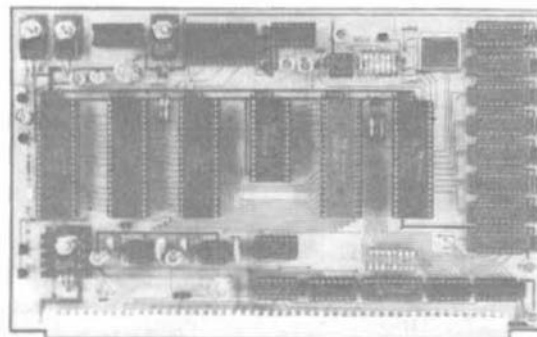
SOFTWARE AND DOCUMENTATION

Programming manuals for Video and Sound Processors
Subroutine library and demonstration game
Software in both BASIC and 6809 assembly

ADDITIONAL I/O CAPABILITIES

Eight analog inputs with 8 bit resolution
Supports four joysticks with pushbutton switches
Eight bit port for ASCII or organ keyboard
Maps into any 256 bytes of memory

ARCADE 50



ARCADE 50, assembled and tested	\$325.
video and audio connector set	15.
4 joystick connector set (5pin DIN)	20.
2 Radio Shack joysticks	24.
UHF modulator	32.
gold molex	12.

LAB VIDEO (EXORciser® version) 1st quarter '82

specify 5" or 8" TSC's FLEX compatible disk
terms: cash, VISA, MC or C.O.D.
overseas orders add \$20

(® Trademark of MOTOROLA INC.)

TERMINUS DESIGN INC
16 Scarbrough Road
Ellenwood GA 30049
(404) 474-4866

Exclusive UNIFLEX* Software Packages for SOUTHWEST TECHNICAL PRODUCTS CORP. SYSTEMS

ACCOUNTS PAYABLE

- Supports invoice aging with account status reporting
- Total monies owed and history of total business done with each vendor
- Manual and automatic check writing and check registers
- Up to 1,000 accounts and 9,000 transactions per 8-inch diskette

\$595

ACCOUNTS RECEIVABLE

- Aged account status
- History of total business done with any account
- Total monies owed at any time by all accounts
- Statement generations
- Up to 1,000 accounts and 9,000 transactions per 8-inch diskette

\$595

PAYROLL

- Supports 70 fields
- 500 employees
- Prints paychecks, federal 941's, W-2's, payroll registers
- Generates time clock card labels, tax-exempt plan and more

\$695

MAILING LISTS

- Sorts on any single or combination of parameters
- Automatic alpha and zip code sorting
- Full business address format
- Support division codes

\$495

Minimum hardware requirements:

- S/09 main frame with minimum 128K • (2) 8-inch double sided, double-density disk drives • 8212 or 8212W terminal

* UNIFLEX is a trademark of Technical Systems Consultants

TO ORDER: Mail Check or Money Order to

COMPUWORLD Inc.

125 WHITE SPRUCE BLVD.

ROCHESTER, NEW YORK 14623

716-424-6260

VISA or MASTER CHARGE accepted (N.Y.S. residents add 7% sales tax)

ATTENTION ORIGINAL EQUIPMENT MANUFACTURERS

REAL-TIME APPLICATIONS

This new line of Unicom and Uniface products, with interrupt driven software, is designed to facilitate interfacing to the industrial and medical environments. These A/D, D/A and digital I/O devices are scheduled for release in 1982.

POWER CONTROL

From entertainment lighting to large inductive loads, our a.c. power control units will fit your need. These versatile modules can be manually controlled or computer interfaced using a special Unicom or Uniface I/O board. Load power is continuously variable, with maximum power ratings of 3000 watts per channel and up. Single and multiphase capabilities are available.

SPECIAL REQUIREMENTS

Contact us and let us know your requirements. We will help you configure your hardware, choose an operating system and develop your application programs.

microdyne

P.O. Box 1707 • Greenville, MS 38701 • (601) 335-9321

6809 C Compiler

VERSION 2.0

- Generates assembly language source output
- Requires only 16K memory
- Extensive library functions in source code
- Generates position independent code
- Supports most C functions
- Generates ROMmable code
- Floating point

Specify diskette size SSB, FLEX, or OS-9

VERSION 2.0 Price \$120.00

The C Programming Language—Kernighan & Ritchie
Price \$16.00

TERMS: Check, MC/Visa. California residents add 6%.
Foreign or C.O.D. add 15% for shipping and handling.

(714) 755-4373



DUGGER'S GROWING SYSTEMS

POST OFFICE BOX 305 SOLANA BEACH, CA 92075

SMOOTH™ Software

SUPER MODEM PROGRAM

Transmit manually to distant computer

Transmit disk files (text) of any length to distant computer

Receive and save disk files (text) of any length on local disk system. If sending computer does not support an X-on/X-off protocol, then the received files are limited in size by the computer memory.

Tested to transmit and receive text at speeds up to 9600 baud. (CRT terminal must be capable of operating at a baud rate higher than the one the modem is operating at.)

Half duplex option in case distant computer doesn't echo.

Echo option so user can simulate a time sharing system. (Super Modem Program doesn't support auto-answer but the source is provided for those individuals who wish to adapt the program to their special needs.)

Replaces CR with CR/LF (user option) for those using time sharing systems that don't transmit LF's.

Slow disk file transmit (user option) based on character verification for use on time sharing systems to which disk file can be sent at speeds suggested by the baud rate.

Please specify 8800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8".

Manual and disk with both source and object code \$75.00

STANDARD MODEM PROGRAM

Same as Super Modem Program above but without ECHO option, CR/LF for CR option, slow disk file transmit option, nor X-on/X-off option. Reception of disk files is limited to those small enough to completely fit within the receiving buffer.

Please specify 8800 SSB, 6800 FLEX™, or 6809 FLEX™, 5" or 8".

Manual with instructions, source listing, and flow chart; disk with both source and object code \$45.00

ALL IN ONE

Editor - Text Processor - Mailing Labels

Mailing Lists - Use any CRT terminal and printer.

Supports Editing commands such as bottom, change, delete, find, insert (single line), input (multiple lines), list, next, overlay (with cursor editing, character deletion and insertion), overstrike (for selected darker text), print, restart, set, top, underline, up, and verify.

Supports Text Processing commands such as block copy, block move, centering, margin justification (wide and narrow), paging, and tabbing.

Mailing Lists and Labels. Use the same mailing list disk file (with protective address) for both mailing labels and repeat letters. Repeat letters are personally addressed to each person or selected persons on the mailing list.

Most Powerful File Handler found in any editor. Append one file to the end of another, or insert (merge) one file into another as designated by line number. Print specified lines to your printer or to a disk file. Edit files larger than the text buffer. Does not produce output files when not desired. Deletes disk files from the editor.

Printer commands. Control characters can be sent to the printer for format control either directly from the control terminal or by embedding them in the text. The set command contains interface initialization and character output routines to support the SWTPC MP-C interface as well as the standard serial and parallel interfaces. Jumps are also provided to user supplied printer routines. User selects the port address (0 thru 7, A or B) thereby eliminating the need for the user to install printer software routines. Editor can be initialized for either 4 or 16 addresses per port.

Editor allows exiting to either the monitor or DOS and then reenter (Warm Start) without destroying previously prepared text in the buffer. The Restart command erases contents in the buffer without the user having to reformat the Editor.

The Editor allows the user to toggle between full duplex (no echo) and half duplex (echo) as needed. It responds to commands in both upper and lower case and can be used to create assembler source code and Basic programs as well as text.

Specify 8800 SSB, 6800 FLEX™, 6809 FLEX™, 5" or 8" 50.00
Printed source listing is available for an additional 35.00

Software by Technical Systems Consultants, Inc.

Flex™ (includes Editor and Assembler) 150.00
UniFLEX™ (includes one year maintenance and update) 450.00

Editor 50.00

Assembler 5.00

6800 Cross Assembler on 6809 250.00

Text Processor 75.00

Extended Basic 100.00

Basic Precompiler (specify standard or extended) 50.00

Pascal (Flex™) 200.00

Pascal (UniFLEX™) (Add \$75.00 for one year's maintenance and update) 225.00

Sort/Merge Package 75.00

6800 Flex™ Utilities 75.00

Debug Package 75.00

Diagnostic Package 75.00

Source 40.00

Manual 15.00

Object 125.00

OS-9™ Level One Operating System 75.00

OS-9™ Level Two Operating System 75.00

OS-9™ Macro Text Editor 300.00

OS-9™ Interactive Assembler 300.00

OS-9™ Interactive Debugger (Disk version) 100.00

CIS Cobol Compiler N/A

Pascal Compiler N/A

Dynalite Disassembler 60.00

SUPER SLEUTH Disassembler System 99.00

SWTPC K11 A assembled

DC-2 Disk Controller (Limited Quantity) N/A

4K RAM Board (Limited Quantity) 30.00

MP-S Single port serial interface (Limited Quantity) 4.00

MP-S2 Serial interface (dual port) N/A

MP-LA Parallel interface (dual port) 40.00

MP-L2 Parallel interface (dual port) N/A

MP-R Single voltage 2716 prom programmer N/A

MP-N Calculator board 54.95

MP-T Interrupt timer N/A

MP-64 64K 4044 Memory board (limited quantity of kits) 180.00

S32 Universal Static Memory Board N/A

MP-08 6809 CPU board N/A

68 Chassis, P.S., 6809 CPU, 8K, RAM, One Serial Port 650.00

Universal 68XX Bare Motherboard. 6800/6809, 4/16 addresses per port, 80.00

50 pin/8 30 pin slots, baud rate generator, 15 1/8" x 9 3/8"

F & D (bare) Motherboard I, 12 50 pin/8 30 pin slots, 4/8 (modifiable 55.00

to 16) addresses per port, complete address decoding, 18" x 9"

Connectors (10 pin, Titanium-Tin plated 5 microns for near gold quality) each 50

Made with Square cross section pins each 75

Female

SMOOTH™ and ELEKTRA™ are trademarks of AAA Chicago Computer Center

FLEX and UNIFLEX are trademarks of Technical Systems Consultants, Inc.

OS-9 and BASIC are trademarks of Microsoft Systems Corp.

GIMIX and GIMIX are registered trademarks of GIMIX Inc.

Prices and inventory are subject to change without advance notice.

This ad is our catalog.

ELEKTRA™ SS50 Computer Products

	Bare Board	Kit	Assembled
DPS Dual Port Serial Interface Board and Doc.	20.00	60.00	80.00
DPP Dual Port Parallel Interface Board and Doc.	20.00	60.00	80.00
Cable (Two required for each interface)			20.00
MB Motherboard and documentation	65.00	N/A	N/A
CPU-8/9 6808-6809 CPU (Run 6800 or 6809 software)	50.00	225.00	275.00

(6808 is 6800 software compatible)

HUMBUG (from STAR-KITS) for CPU-8/9 board 40.00

2K version for 6800 (6808) 75.00

HUMBUG-08 for 6809

Other HUMBUG versions including video versions are available. (Specify system)

Chassis (0.090" aluminum, inside dimensions 21 7/8" x 16 1/2" x 6 3/4",

2 cutouts for 5 1/4" disk drives, drive mount, line cord, line

fuse, key (power) switch, reset switch, abort switch, 70 cfm fan,

EMI filter, 10 RS-232 cutouts and power supply (15A 8V,

3A 16V, 3A -16V), use any current S -50 or SS-50C motherboard, choice

of disk regulator board with cables or 2 filter plates 450.00

220v version of above for export add 50.00

Chassis without power supply, disk regulator, nor filter plates 250.00

Power supply (15A 8V, 3A 16V, 3A -16V) 110v 175.00

Double head, single or double density capability, 40 X 2 tracks 335.00

Power supply (15A 8V, 3A 16V, 3A -16V) 220v 225.00

5" disk regulator board with cables for 2 5-1/4" disk drives 50.00

Filter plate for 5-1/4" cutout 10.00

Filter (fan) 10.00

5 1/4" DISK DRIVES with 30 day guarantee

Single head, single or double density capability, 40 tracks \$250.00

Single head, single or double density capability, 40 tracks, floppy 280.00

Double head, single or double density capability, 40 X 2 tracks 335.00

Single head, single or double density capability, 80 tracks 335.00

Double head, single or double density capability, 80 X 2 tracks 470.00

MP1 - Service Manual 20.00

ELEKTRA Dual drive cabinet for 5 1/4" drives with power supply, line cord,

fuse, power switch, and power cables to drives 125.00

Dual Drive cabinet and power supply for 8" drives 350.00

Microtime 6800 Calendar and Clock Board (assembled and tested) 105.00

Bareboard, connector, and documentation only of above 35.00

(See review Feb. 1980 '68 Micro Journal)

Microtime II 69.95

Data Mart 16K EPROM bareboard (2708 chips) 30.00

Printers

Epson MX-80 (Centronics compatible parallel interface) 495.00

(With Serial RS-232 interface option) add 75.00

Spare Print Head 39.95

Spare ribbon cartridge 15.00

C. Hoh Comet I 125 cps, 9 x 7, bidirectional, serial or parallel 445.00

GIMIX (The Ultimate)

6800 CPU Board 224.00

with timers 268.00

with baud rate option add 30.00

with 2MHz option add 15.00

2 MHz 6809 Plus - CPU, time of day clock, battery backup, 1K NMOS RAM 578.05

CMOS RAM substitution 8.00

GIMIX Dynamic Address Translator 35.00

SWTPC compatible DAT 15.00

9511A Arithmetic Processor (4MHz) 312.00

9512 Arithmetic Processor (3MHz) 265.00

GMXBUG-09 (Terminal Based) 1K scratchpad required 98.65

Bootstrap Prom 30.00

Video Prom (includes Bootstrap) 30.00

Manual and Source Listing only 38.82

Missing cycle detect card 38.23

Disk Controllers (All have data separators and can be used with either single

or double density drives) 8.00

5" single density controller without 1771 chip 158.38

5" single density controller complete 198.48

5" and 8" single density controller complete 228.58

5" double density controller with variable precomp 298.28

DMA 5" AND 8" double density controller with variable precomp 588.68

GIMIX version of FLEX™ (without Editor and Assembler) 90.00

Double disk regulator card 68.22

Ribbon cable for two 5 1/4" disk drives (short) 34.96

Ribbon cable for two 5 1/4" disk drives (long) 44.96

Ribbon cable for two 8" disk drives (long) 44.26

8" disk drive cabinet with power supply 848.18

Memory

16K Static RAM Board with control registers** 365.16

32K Static RAM Board with 32K of RAM installed* 375.00

**discontinued, limited quantity available

64K Static RAM Board with 24K of RAM installed N/A

64K Static RAM Board with 32K of RAM installed 518.36

64K Static RAM Board with 48K of RAM installed N/A

64K Static RAM Board with 56K of RAM installed 728.56

64K Static RAM Board with 64K of RAM installed 798.64

16 Socket EPROM/ROM/RAM Board 258.32

8K Promboard (2708) 98.34

4K PPO 4K Prom Board and 2708 Prom Burner 198.00

I/O Boards

Single port 30 pin serial interface (Requires 1 cable set) 88.41

Dual port 30 pin serial interface (Requires 2 cable sets) 128.43

8 port 50 pin serial interface with baud rate generator 318.48

Dual port 30 pin parallel interface (Requires 2 cable sets) 88.42

8 port 50 pin parallel interface with interrupt generator 198.45

Cable sets for above boards (specify board) 22.95

Video Boards

64 or 32 X 16 198.71

80 X 24 without RAM character generator 398.74

80 X 24 with RAM character generator 458.78

High resolution (512 X 512 dot resolution) 995.77

2MHz 6809 PLUS Computer System with 56K Memory* 2498.29

Above System with #58 Controller and Special Software Pkg.* 2988.59

Above System with #58 Controller and Special Software Pkg.* 3248.49

*with CMOS RAM and Battery Backup add 300.00

Mainframe (Chassis, PS, Switches, Fan, Motherboard, Baud Rate Gen.) 1198.19

Shipping and handling estimates:

Within the Continental U.S. please add 3% (\$5.00 minimum).

Foreign, prepaid and add 10% (\$10.00 minimum) for light items only.

Heavy items must be prepaid and will be shipped Emery Air Freight Collect.

Please phone during consultation hours if questions arise regarding shipping fees.

Master Charge, Visa, and American Express honored

AAA Chicago Computer Center

120 Chestnut Lane, Wheeling, IL 60090

(312) 459-0450 Phone Consultation available most weekdays from 4 PM to 6 PM

Introducing MSP 16-bit Multi-Tasking Systems Software

The real-time system, you can have on-time.

Now you can get a high quality 16-bit multi-tasking operating system for most M68000 and Z8000 based systems.

Hemenway's MSP real-time system is an efficient and comprehensive operating system for industrial or business use.

MSP Systems Software is easily adaptable to any hardware configuration. And because it's designed to be extensible, you can mold your operating system to your needs by adding new features or modifying existing ones. Quickly and easily.

Plus, tasks can start/stop other tasks and communicate with each other through submit functions (pipes) and mail-boxes (tubes).

You can also have macro assemblers, text editors, floating point packages, monitors, scientific packages, linking loaders, single-user operating systems and high-level languages. Off-the-shelf.

For the hard facts on Hemenway software, write or call:

Hemenway Corporation,
101 Tremont St., Boston,
MA 02108. Phone:
617-426-1931.
TWX 710 321 1203.
TELEX
921735.

THE CHIEFTAIN™ 5¼-INCH WINCHESTER HARD DISK COMPUTER

SO ADVANCED IN SO MANY WAYS . . .
AND SO COST-EFFECTIVE . . .
IT OBSOLETE MOST OTHER SYSTEMS
AVAILABLE TODAY AT ANY PRICE.



● HARD DISK SYSTEM CAPACITY

The Chieftain series includes 5¼- and 8-inch Winchesters that range from 4- to 60-megabyte capacity, and higher as technology advances. All hard disk Chieftains include 64-k memory with two serial ports and DOS690 disk operating system.

● LIGHTNING ACCESS TIME

Average access time for 5¼-inch Winchesters is 70-msec, comparable to far more costly hard disk systems. That means data transfer *ten-times faster* than floppy disk systems.



● 2-MHZ OPERATION

All Chieftains operate at 2-MHz, regardless of disk storage type or operating system used. Compare this to other hard disk systems, no matter *how* much they cost!

● DMA DATA TRANSFER

DMA data transfer to-and-from tape and disk is provided for optimum speed. A special design technique eliminates the necessity of halting the processor to wait for data, which normally transfers at a slower speed, determined by the rotational velocity of the disk.

● RUNS UNDER DOS OR OS-9

No matter which Chieftain you select . . . 5¼- or 8-inch floppy, or 5¼- or 8-inch

Winchester with tape or floppy back-up . . . they **all** run under DOS or OS-9 with **no need** to modify hardware or software.

● UNBOUNDED FLEXIBILITY

You'll probably never use it, but any Chieftain hard disk system can drive up to 20 other Winchesters, and four tape drives, with a single DMA Interface board!

● SMOKE SIGNAL'S HERITAGE OF EXCELLENCE

This new-generation computer is accompanied by the same **Endurance-Certified** quality Dealers and end-users all over the world have come to expect from Smoke Signal. And support, software selection and extremely competitive pricing are very much a part of that enviable reputation.

20-Megabyte Tape Streamer Back-Up Option

Available with all Chieftain hard disk configurations. This cartridge tape capability provides full 20-megabyte disk back-up in less than five minutes with just one command, or copy command for individual file transfers. Transfers data tape-to-disk or disk-to-tape. Floppy back-up is also available in a variety of configurations.

The Chieftain Computer Systems:

Here are the Chieftain 6809-based hard disk computers that are destined to change the data processing industry . . .

☐ CHIEFTAIN 95W4

4-megabyte, 5¼-inch Winchester with a 360-k floppy disk drive (pictured).

☐ CHIEFTAIN 95XW4

4-megabyte, 5¼-inch Winchester with a 750-k octo-density floppy disk drive.

☐ CHIEFTAIN 98W15

15-megabyte, 5¼-inch Winchester with a 1-megabyte 8-inch floppy disk drive.

☐ CHIEFTAIN 9W15T20

15-megabyte, 5¼-inch Winchester with a 20-megabyte tape streamer.

**Write or call today
for details (including the
remarkably low prices)
on the total Chieftain
Series . . . and on
dealership opportunities.**



SMOKE SIGNAL BROADCASTING®

31336 VIA COLINAS
WESTLAKE VILLAGE, CA 91362
TEL (213) 889-9340

Name _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone (_____) _____

S
A
V
ED
I
S
K

VERBATIM DATALIFE DISKS WORLDS FINEST QUALITY DISKS

5" Soft Sector Disks	8" Soft Sector Disks
Single Side Single Density \$2.75 ea.	Single Side Single Density \$3.75 ea.
Single Side Double Density \$2.75 ea.	Single Side Double Density \$4.10 ea.
Double Side Double Density \$4.92 ea.	Double Side Double Density \$4.75 ea.
Plastic Storage Box \$2.00 ea.	Plastic Library Box \$5.00 ea.

Foreign Orders Add 10% Surface—20% Air Mail

DEALER AND VOLUME DISCOUNTS AVAILABLE

Making Labels on M X-80?
Lab 3X Program Runs Under TSC X-Basic to print
labels 3 across on your MX-80 Printer.

5" Program Disk \$24.95

8" Program Disk \$29.95

Labels 2-1/2" x 15/16" 3 across \$3.95 per 1000

DIET-TRAC Forecaster

A Diet Planning and Analysis Program
Based on Food Exchanges

DIET-TRAC Forecaster is a program that plans a diet in terms of either calories and percentage of carbohydrates, proteins and fats (C/P/F %) or grams of Carbohydrate, Protein and Fat food exchanges of each of the six basic food groups (vegetable, bread, meat, skim milk, fruit and fat) for a specific individual.

Sex, Age, Height, Present Weight, Frame Size, Activity Level and Basal Metabolic Rate for normal individuals are taken into account. Ideal weight and sustaining calories for any weight of the above individual are calculated. When a weight goal is given (either gain or loss), and a calorie plan is agreed upon between the computer and the individual, the number of days to reach the weight goal is projected. The starting and ending rate of weight loss is calculated, and a daily calendar with each day's predicted weight for a 30-day period is printed.

Please specify 5" or 8" disk.

Source listing and documentation

\$300.00

SOUTH EAST MEDIA
P.O. Box 794 Chattanooga TN 37443
1-615-842-4601

This simple statement pulls your low inventory report...

>FILE PRODUCTS LIST IF STOCK < 10 END

...so why write a program? This and more are easy with...

DMS2/VM DATA MANAGER \$100.00

A complete Data Management System which permits files up to 1000K, precision BCD arithmetic, Multi-key access, selection and sorting. DMS2/VM employs a virtual memory access method under which programs "think" that entire files are in memory and directly accessible. The system supports alphanumeric, numeric, decimal, integer, coded and hexadecimal field types. Up to 24 fields and 12 levels per file may be defined by the user. A simple high-level command language allows a variety of data manipulation including reformatting, calculations, inquiry, key-merge, summation, print and display of database data.

ACC2/VM ACCOUNTING SYSTEM \$350.00

All essential accounting and bookkeeping functions including journal, ledger, income statement and balance sheet. The user defines accounts, products and transactions to the system and thus tailors it to his own retail, wholesale or service environment. The system operates under DMS2/VM which permits custom reports of product movement or account status to be generated. Accounts receivable and payable are integral to the system as is point-of-sale capability.

MFT1 MULTI FIXED TASK O/S \$100.00

Allows user definition of region size for up to eight terminal/tasks and emulates FLEX O/S for simultaneous execution of each task. Allows cross scheduling (eg: printer regional and inter-task communications).

UTILITIES "A LA CARTE" - \$5.00 EACH

DUMP - Output any section of memory in hex and ASCII. DDBK - Output any disk sector in dump format. DMAP - Output track & sector chain of any file. PHAP - Output load map of command files. LISTD - Output all directory info on files. LISTDS - Output selected directory info in three columns. LISTF - List file with disk id & date heading. KILL - delete files without "are you sure" prompt. FIND - Output all file records containing a given string. MCOPY - Copy files between disks using one drive. All load at \$C100 and output may be directed to CRT, printer or disk. MINIMUM ORDER - \$25.00. All 10 for \$40.00.

All software is written in modular assembler and runs on SMP: 6809 with FLEX O/S and 8" disk. DMS2/VM Ver 1.3 requires 36K or more RAM. Ver 2.0, available soon, runs in 16K or more and is MFT1 compatible. Manuals available. DMS2/VM \$10., Accounting \$15., deduct from order. Add P&H \$2.50. Foreign \$5.00. N.Y. State add sales tax. No C.O.D. Send Purchase Orders on letterhead or Check orders to!

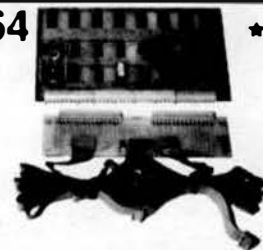
WESTCHESTER Applied Business Systems
Post Office Box 187
Briarcliff Manor, N.Y. 10510

Conventional 914-941-2552 (6-11 PM, EST)
Sales Rep: 212-899-1488 (Visa, M.C. orders, Catalog requests)

FLEX is a trademark of Technical Systems Consultants, Inc.



★ CT-64 ★ CT-1024



★ DMA VIDEO ADAPTER FOR YOUR TERMINAL

- DMA (ability to update anyplace on the screen directly)
- HIGH SPEED DISPLAY (fast as any video board)
- KEYBOARD CONTROL (of baud rate and paging /scrolling)
- DOCUMENTATION (includes source listing that replaces Outee)

J.B.I. adapter with memory \$142.50, J.B.I. adapter without memory \$129.50. Source Code on Disk \$5.00 — Tape \$3.50

Provide your system configuration and software.
Terms: cash, MC, Visa or C.O.D. plus \$3.50 shipping and handling.

Johnson Micro Computer

2607 E. Charleston
Las Vegas, Nev. 89104
1-702-384-3354

THOMAS INSTRUMENTATION

THE MACHINE TOOL, INDUSTRIAL SPECIALISTS IN BUSINESS ON A FULL TIME BASIS FOR 10 YEARS

NEW PRODUCT:

S-R/R

48K 2MHz STATIC RAM/ROM CARD

- *24 2K blocks memory mapped on any 2K boundary
- *uses low power 2016P-2 (2128) RAM and/or 2716 ROM
- *mix 4K blocks of RAM and ROM
- *6800 and 6809 compatible
- *use on SS-50 and SS-50C buss
- *decoded for extended addressing
- *5 volts only
- *low power consumption (typ. 1/2 amp with 48K RAM)
- *gold connectors

Bare Board \$49.00 2716 1MHZ \$9.95 2016 P-2 2MHZ \$16.50

A/T with 16K \$250.00: with 32K \$375.00: with 48K \$495.00

A/T without memory chips \$120.00

NEW ACCESSORIES FOR 68XX USERS:

SS-50/SS-50C EXTENDER CARD \$35.00

SS-30 EXTENDER CARD \$25.00

*Both cards assembled with a built in logic aid & gold edge connectors

SS-30 WIRE-WRAP/PROTOTYPE BOARD (board only) \$20.00

*Pad spacing permits most standard sockets from 8 to 64 pins

*Provision has been made for voltage regulators

FEATURED PRODUCT: SP-1 Bare card \$49.00 Asm. + tested \$195.00

*A super prototype board

*Card design includes

(3) 6821 6 parallel ports

(4) 6850 4 serial ports

(1) 6840 3 16 bit counter/timers

which are fully buffered and decoded

*Accommodates a mix of 38, 14 & 16 pin wire wrap sockets

*Pad spacing permits most standard sockets from 8 to 64 pins

MODEM CARD

special parts kit

A/T without extra features

*SUPER CPU assembled with source listing

without 2K EPROMS (2-2708)

*Monitor in two 2708 EPROMS

*CPU bare card, doc., & src.

*VIDEO RAM asm. 7x9 chars 64x16

*VIDEO RAM bare, doc, Xtal, src.

*PARALLEL I/O asm 100 I/O lines

incl. 5 PIA's for 10 ports

*PARALLEL I/O bare card & doc.

*SS-50 WIRE-WRAP/PROTOTYPE bare

*TRANSITION CARD asm.

*TRANSITION CARD bare

B/C

\$ 49.00

\$195.00

\$325.00

\$235.00

\$ 29.00

\$ 59.00

\$195.00

\$ 49.00

\$139.00

\$ 49.00

\$ 39.00

\$ 95.00

\$ 49.00

A/T with extra features

Software obj. & src. on FLEX disk

BACKPLANES AND MOTHERBOARDS

*16 position SS-50

*12 position SS-50

* 8 position SS-50

* 6 position SS-50

* 4 position SS-50

* 8 position SS-30

**Connectors:

GOLD \$1.60 ea. (M or F)

TIN M \$.40 ea. F \$.50 ea.

\$395.00

\$ 10.00

\$80.00

\$60.00

\$40.00

\$30.00

\$20.00

\$39.00

DEALERS FOR SWTPC, GIMIX, AND TSC

*All Thomas Instrumentation's cards come with full documentation including software source listings where applicable *All assembled cards are burned in at 150F and fully tested with Gold conn. *Bare card prices do not include edge connectors

*See previous ads, write, or call for more detailed information.

THOMAS INSTRUMENTATION

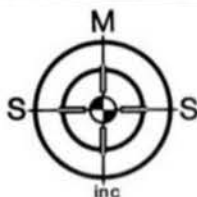
168 EIGHTH STREET — AVALON, N.J. 08202 (609) 967-4280

NJ RES. INCLUDE 5% SALES TAX

CONT. USA INCLUDE \$3.00 SHIPPING, CANADA \$6.00, FOREIGN \$12.00

MASTERCARD, VISA, and C.O.D. ACCEPTED

To satisfy in-depth questions regarding our products send \$20.00 to receive full documentation, schematics, & source listings for all boards currently in production



SOUTHEASTERN MICRO SYSTEMS, INC.

1080 IRIS DRIVE
CONYERS, GA 30207

404-822-1820

New Product!

BTR-09 TERMINATOR BOARD

- FOR 88-80 AND 88-80C BUS
- REMOVES MOST ADDRESS AND DATA LINE NOISES
- SYSTEMS RUN WITH LESS ERRORS
- DISK SYSTEMS PERFORM BETTER
- USES TERMINATOR PACKS

ASSEMBLED

\$25.00

1982 Catalogs are now available!

64K/256K DYNAMIC MEMORY BOARD

- MAY BE CONFIGURED TO USE:
16K x 1 DYNAMIC RAM (4118/8118)
FOR 64K OR
64K x 1 DYNAMIC RAM (8264/8868)
FOR 256K
- TOTALLY TRANSPARENT REFRESH
- RUNS AT 1.6 MHZ
- SUPPORTS EXTENDED ADDRESSING UP TO 1 MEGABYTE
- USES VDISK(1M) FOR 256K OR EXTENDED MEMORY

256K ASSEMBLED
\$795.00

64K ASSEMBLED
\$450.00

64K KIT
\$395.00

BARE
\$75.00

VDISK

- ALLOWS FLEX(1M) USERS TO TREAT EXTENDED MEMORY AS A SUPER-FAST DISK DRIVE
- HAS ITS OWN DIRECTORY AND MAY CONTAIN PROGRAM AND DATA FILES
- FILES MAY BE COPIED TO IT AND FROM IT
- FLEX(1M) UTILITIES AND USER PROGRAMS MAY READ FROM AND WRITE TO THIS DRIVE

\$99.00

(Specify 5 1/4" or 8" disk)

"You're always on target
with Southeastern Micro
Systems"

Master Charge, Visa, American Express Accepted

US SHIPPING \$2.00. FOREIGN ADD 10%
(US FUNDS ONLY)

ALL - IN - TWO



- BY POPULAR DEMAND WE HAVE SPLIT OUR 'ALL-IN-ONE' EPROM PROGRAMMER INTO TWO BOARDS: AN 8-30 I/O CARD AND A PROGRAMMER ASSEMBLY. THE PROGRAMMER, WITH ITS BASEPLATE, ARE EXTENDED OUT TO YOUR WORK AREA VIA 5' OF TWISTED PAIR CABLE. THIS KEEPS THE LID ON COOLING PROBLEMS AND MAKES USE MUCH MORE CONVENIENT THAN SINGLE BOARD DESIGNS.
- PROGRAMMES AND VERIFIES 2500/2700, 2510/2710 (SINGLE AND TRI-VOLT TYPES) 2532, 2732, 2732A, 2564, 2764 AND THE 128K TMS2528 (10K x 8).
- EXTENSIVE COMMANDS MENU PROVIDES THE FOLLOWING FACILITIES:
MOVE BLOCKS OF DATA, READ FROM INTO BUFFER, PROGRAM FROM FROM BUFFER, VERIFY FROM AGAINST BUFFER, EXAMINE/CHANGE BUFFER, FORMATER DUMP OF BUFFER, FILL BUFFER WITH SPECIFIED BYTE, RETURN TO DOS OR MONITOR.
- FULLY DOCUMENTED USER'S MANUAL PROVIDES STEP-BY-STEP ADAPTATION AND OPERATING INSTRUCTIONS.
- SOFTWARE SOURCE FILE INCLUDED...ENABLES CUSTOMIZING.
- PROFESSIONALLY FINISHED PCB'S W/ SOLDER RESIST & COMPONENT OVERLAY.

PCB'S, BASEPLATE, SOFTWARE, & DOCUMENTATION.....\$45.00
HARD TO GET PARTS KIT (SPECIAL DIL SWITCHES, IND., VU RES).....\$15.00
ASSEMBLED & BURNED IN, C/W INTERCONNECTING CABLE.....\$375.00

SPECIFY: CPU (6800/6809), DISK SIZE (5 1/4"), AND DOS (SSB/FLEX).
NOTE: A MODULE WILL BE AVAILABLE FOR OS-9 IN APRIL '82.

PRICES INCLUDE SHIPPING VIA REGISTERED AIR MAIL.
(WHICH IS NOT CHEAP!!!)

PAYMENT BY: INT'L MONEY ORDER, BANK DRAFT, VISA OR MASTER CHARGE.

WINDRUSH MICRO SYSTEMS LIMITED
GAYNERS WAY INDUSTRIAL ESTATE
NORTH WALSHAM, NORFOLK
ENGLAND, NR28 0AN

TEL: (0492) 405189
TLX: 97360 SHABET G

WE ARE A STOCKING DISTRIBUTOR OF SSB, GIMIX, TSC AND MICROWARE.

C Compiler for 6809

Adapted from Ron Cain's SMALL-C. FLEX9 version requires RLOAD (included on separate disk). Full C to come in three steps: 1.0 now; 2.0 - 3Q/82; 3.0 - 1Q/83. Upgrade policy and prices to be announced. Run-time library source included. 48K recommended.

For FLEX9 (with loader) \$52.50
(If you already have RLOAD) \$47.50
RLOAD 3.0 separately \$17.50
For DOS69D (specify assembler) \$47.50

Shipping included. Prices good until July '82. Add \$2/disk for 8". Add \$2 handling for Visa/MasterCard. Allow 4 weeks for non-certified check. Please do not send cash. Texas residents: add \$0.25 sales tax per 5" disk, \$0.35 per 8" disk.

FLEX is a trademark of Technical Systems Consultants. DOS69D is a trademark of Smoke Signal Broadcasting.

word's worth

P.O. Box 28954
Dallas, Texas 75228

E X T R A FLEX & RS COLOR COMPUTER

The 'GOOD NEWS' is now here, the popular and very powerful FLEX™ disk system is now running on the Radio Shack Color Computer™!

The system can be ordered in parts as needed. OR AS A COMPLETE RUNNING SYSTEM, all you furnish is a color or B&W TV or monitor, and a desire to learn and use the powerful FLEX™ disk system and the Motorola 6809 microprocessor. The necessary software includes the special Technical System Consultants's 6809 General FLEX™ (\$150 including the Editor and Assembler). Note that the Editor and Assembler normally sell for \$50 each, which means that FLEX™ (special) is only \$50 as packaged. Also to mate up the system we offer the following software and hardware packages.

F-MATE™: (For Radio Shack system and Exatron) a set of software supplied on 5 inch diskettes. F-mate generates the interface between the disk controller*, FLEX™, editor, assembler, word processor** and the color computer. Simple step-by-step instructions detail the creation of a 'Sysgen' disk and then a final 'bootable' FLEX™ disk for the Color Computer. Included is: EXBOOT which is the power-up boot on disk, EXLOADER is used to load a virgin FLEX.COR when performing a Sysgen operation (the supplied assembler is required). The disk controller ROM is the interface at this stage of the operation. Also included is GETOFF which unloads and offsets needed programs to avoid conflicts in memory utilization. GETOFF can be used as a normal FLEX™ program once the bootable disk is finished. PATCHES is furnished to complete the interface between the new FLEX™ system and the Color Computer.

PATCHES: patch and make functional various standard TSC utilities and programs including APPEND ASMB COPY EDIT PUTLDR SAVE and others. A special NEWDISK (single side, single density, 35 track) routine allows disks made on the Color Computer to be read or written on other FLEX™ systems, insuring complete transfer of disks from Standard S50 Bus computers.

Additional new software patches are being developed for existing Standard S50 Bus FLEX™ software. They will be advertised as soon as reasonable debugging sessions indicate they function as expected.

*** TSC's Extended BASIC (XBASIC) patches are now running. Others to follow; call for current information.

COLOR BASIC SAVE & LOAD

A set of utilities will be announced soon. Included in this package will be utilities to LOAD and SAVE the Microsoft BASIC programs you write for the Color Computers ROM BASIC. Fact is that this FLEX™ system does not in any way change the normal Radio Shack BASIC operation. All Radio Shack game-paks and other hardware and software can be used when desired. Also you have the powerful and very useful Radio Shack BASIC™, TSC XBASIC, Radio Shack Color Disk System and/or the Exatron disk system, you end up with three systems, FLEX™, Exatron™ or the Radio Shack system!!

****NEW****

NOTE: Also ready by the time this is published will be the F-Mate™ version for the Radio Shack Color Computer Disk System!!

VISA or MASTER CHARGE accepted



PRICES

FLEX special general version \$150.00
Includes Editor and Assembler

F-mate™ as described above but not
including coming utilities

** Specify RS Disk System or
Exatron Disk System **
When ordered with FLEX \$ 49.95
Without FLEX \$ 59.95

*Special Exatron Disk Controller with
32K RAM expansion \$299.95

NOTE: This unit required
for the above system.

Radio Shack Color Disk System
Single drive with controller
and power supply \$579.50

Screen-Clean™ - RFI hash eliminator
for the standard Exatron Expansion
and disk controller (removes
most of the monitor screen hash)
Kit..... \$ 19.95
Wired and tested..... \$ 39.95

Single Disk Drive with +en-
closure - single side, 40
track - double density \$329.95

Dual Disk Drive with +enclos-
ure - single side, 40 track
double density \$649.95

Single drive cable \$ 24.95
Double drive cable \$ 34.95

Radio Shack 16K Color Com-
puter, with Extended BASIC
and ready for above items \$595.00

With the above as a package you have
a FULL 48K RAM plus ROM computer with
FLEX™ and disk(s) for LESS THAN \$1500
and with C O L O R!!!

Additional Disk drives with enclosure
and power supply \$329.95

** Coming soon
+ With Power Supply

DATA-COMP
SOUTH EAST MEDIA
P.O. Box 794 Chattanooga TN 37443
1-615-842-4601

Add \$25.00
Shipping & Handling
For Complete Set



GA 30752

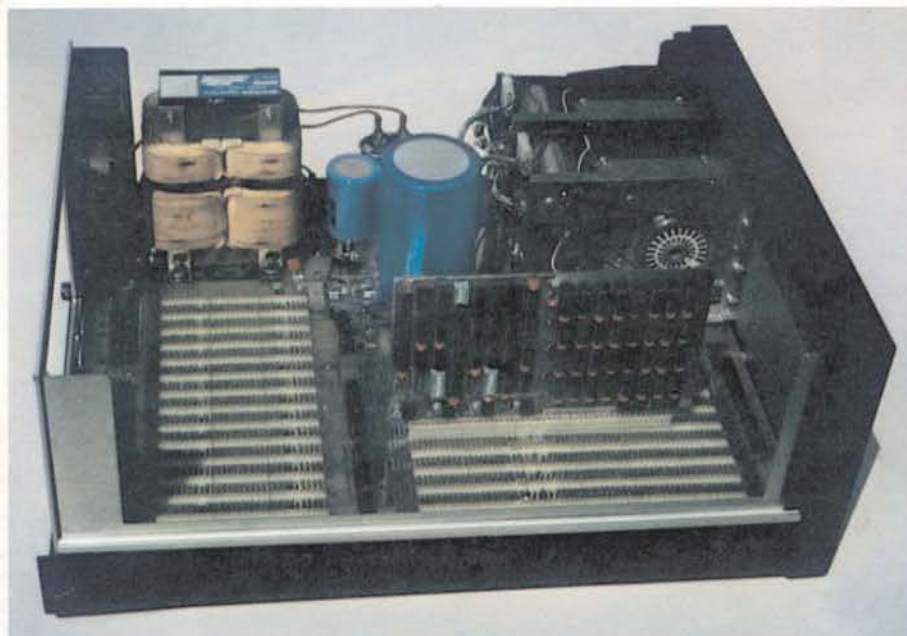
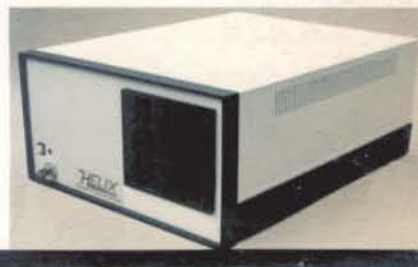
TRENTON

BOX 708

MICKIEY FERGUSON
422 A/E

MJ

HELIX™



THE MAINFRAME

- Industry Standard Optima™ Cabinet
- Largest Constant Voltage Power Supply in the industry
- S-64 Bus gives 16 Bit Power and S-50 Bus Compatibility
- 10 Main (S-64) Slots
- 14 I/O (S-30) Slots plus 2 On-board
- On-board Baud Rate Generator to 38.4Kb
- Space and Power for two 5 1/4" Disk Drives
- Full Address Decoding for I/O Slots
- Two RS-232 Serial and Two parallel Ports On-board
- Single Board Construction for Reliability
- Faraday Shielded Bus Lines give "Text Book Clean" Signals

THE PROCESSORS

6809

- Standard 2 MHz Operation
- Standard DAT Compatible with GIMIX and SWTPC
- Standard 6840 Interval Timer
- Standard 1K Scratchpad RAM
- Standard Clock/Calendar with Battery
- Provision for Programmers Console

68000

- Standard 8 MHz Operation
- Memory Management Hardware
- Provision for Programmers Console
- 16 Bit Power and 8 Bit Compatibility



THE POWER SUPPLY

- Ferro-resonant Transformer for Line Noise and Under-Voltage Protection
- Conservative 25 Amps at 8.5 Volts
- Conservative 5 Amps at ± 16 Volts
- Conservative Component Rating for Reliability

THE COMPONENTS

- Fully Socketed
- Gold Plated Bus Connectors
- Only "B" Series 68XX Components Used
- Only Top Grade Logic Circuits Used
- Industrial Grade Components Throughout

The HELIX™ computer system represents the latest advance in S-50 bus computer systems. Relying on the physical nature of S-50 bus connectors to guarantee compatibility, the HELIX adds 14 bus lines (becoming S-64) to allow a 68000 processor to operate with full 16 bit data transfer and 24 bit addressing, while at the same time providing full interchangeability with existing S-50 components.

Offered with a selection of processors, memories, and peripheral controllers, a HELIX system can be configured for applications ranging from advanced hobbyist to multiterminal time-sharing.

Designed to offer the utmost in speed, reliability, and utility at a reasonable price, it represents a new standard of quality for those who require a professionally designed computer for professional use.

THE MEMORIES

DM-64

- Field Proven
- Proprietary Memory Control Logic
- Fully Transparent Refresh
- Tested at 2.5 MHz Operation

DM-512

- 512K Bytes on a Single S-64 Board
- 16 Bit Power and 8 Bit Compatibility
- Runs in Existing S-50 Systems where Physical Space Allows
- Full 24 Bit Addressing
- Fully Transparent Refresh

THE PRICES

Because of the variety of configurations possible, full pricing cannot be given. Representative prices are:

- 64K 6809 HELIX \$1995
- 64K 68000 HELIX \$2595
- 512K 6809 HELIX \$4450
- 512K 68000 HELIX \$4995

HAZELWOOD COMPUTER SYSTEMS

7413 N. Lindbergh, Hazelwood, Missouri 63042

(314) 837-3466

Dealer and OEM Inquiries Invited. We support our Dealers.

Optima is a Trademark of Scientific-Atlanta